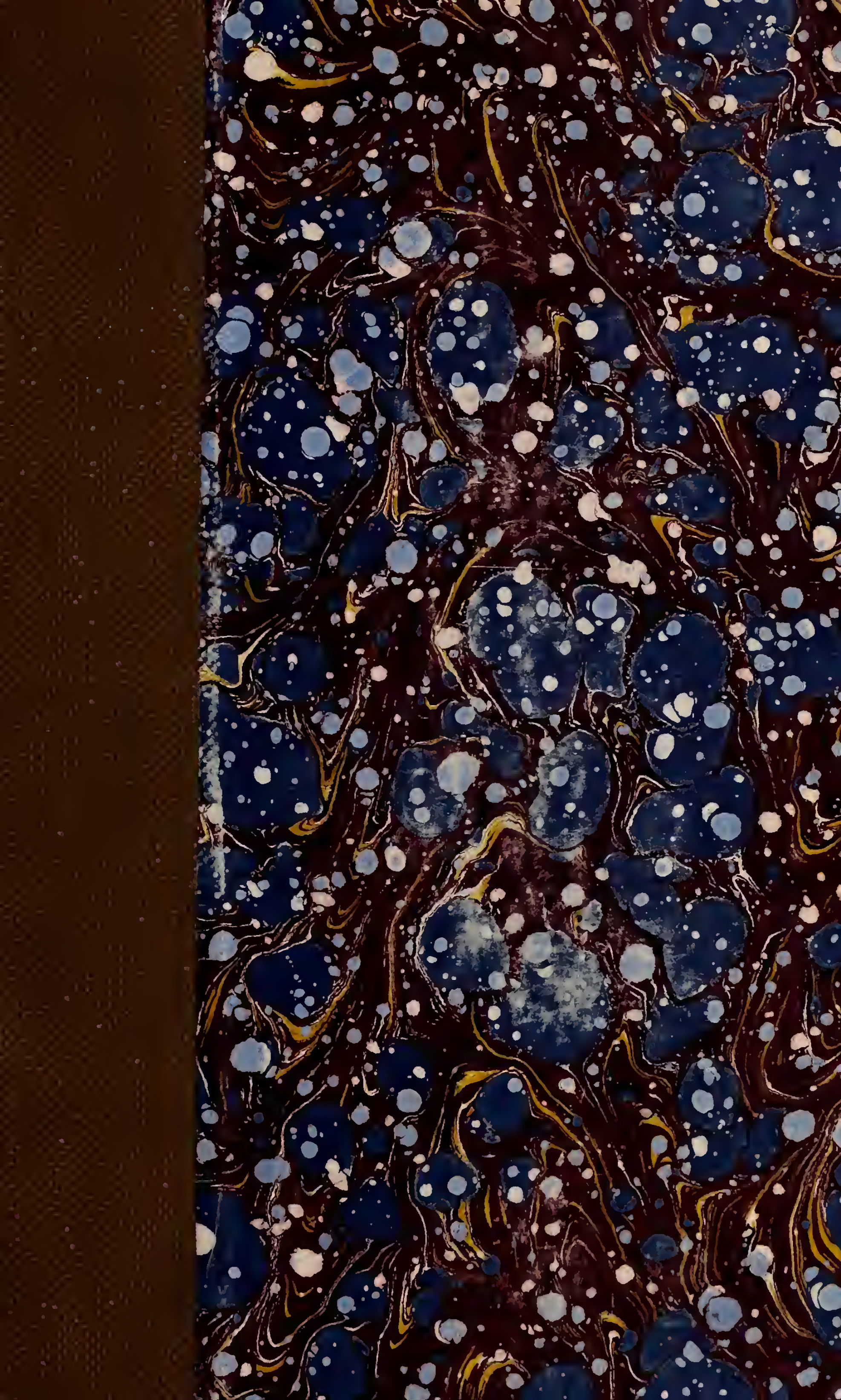

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THE AMERICAN JOURNAL OF PUBLIC HYGIENE

WITH the November, 1907, number the American Journal of Public Hygiene became the official organ of the American Public Health Association, Laboratory Section.

With the assumption of its new duties it has dropped its sub-title, becoming now the American Journal of Public Hygiene, a title expressive of the exact field it aims to cover.

By the new arrangement, all members of the American Public Health Association receive this Journal, while the present subscribers and members of the local association profit by the added valuable material with no increase in price.

We trust this is but one step toward the consummation of what seems to the editorial staff most desirable,—a closer relationship between the various local public health organizations and the national association.

B. R. RICKARDS, *Managing Editor.*

TIME LIMIT *VERSUS* CULTURE LIMIT IN DIPHTHERIA RELEASE

It is only by request that this subject is again presented in the Journal, for the health department in Providence has no desire to force its method on others, but only maintains that for that city it is the most satisfactory thus far tried. Although we release diphtheria patients, that is, remove the warning sign, after a certain time limit, we do not differ from Dr. Hill as to his most important contentions. It is claimed that the time limit is illogical, that it releases some too soon and confines others too long, and so works injustice. Granted, but the general management of this disease is illogical. There are only two logical methods of handling diphtheria. One is not to handle it, do nothing; the other is is isolate every infected person so long as diphtheria bacilli can be found in nose or throat. We all decline to adopt the first course, and it is impossible for us to adopt the second. We are all, therefore, forced into a more or less illogical compromise. Again Dr. Hill is undoubtedly correct in assuming that only a small part of our diphtheria is derived from convalescents. His two per cent is doubtless a fair estimate. Hence he rightly infers that the prevalence of diphtheria will not be noticeably affected by whatever method convalescents are controlled. The comparative statistics of the culture, and time limit methods of release, are said to prove little, and that is true. The difference in the results from the two methods must be so small, at most much less than two per cent, that it is quite likely to be masked by other and more important factors. Thus it can hardly be conceived that the time limit could give better results than cultures, yet this is exactly what the few available data appear to indicate. We do, however, believe that the figures demonstrate that no appreciable danger is to be apprehended from the employment of the time limit method of release.

Dr. Hill wisely said that it is much more important to deal effectively with the early, unrecognized, and concealed cases, than it is to split hairs over methods of release. While it is admitted, as suggested by Dr. Hill, that few families, on the development of sore throat, would, before sending for a doctor, stop to estimate the probable duration of isolation, yet it seems almost self-evident that there will be less temptation to conceal cases, and greater readiness to call the physician early, and in mild attacks, if there is no general dread in the community of long continued periods of isolation, with enforced idleness of workers, and loss of school attendance for the children. In Providence there was much friction due to the culture method of release, and frequently great irritation on part of patients and physicians. It was a great relief to all concerned when the time limit method was adopted. There certainly seems to be less popular objection to admitting the presence of diphtheria than formerly. After a trial of nearly six years there is no disposition on the part of any to again make use of cultures for the termination of isolation. We admit that our time limit releases some too soon, and restrains others too long, and is consequently illogical, and we can, therefore, have no quarrel with those who, while applying scientific methods of restraint to the patient, are illogical enough to let other members of the family, whom they know are equally infected, go free.

CHARLES V. CHAPIN.

American Public Health Association
LABORATORY SECTION

IMPRESSION PREPARATIONS AND THE VAN GIESON STAIN FOR NEGRI BODIES *†

By **LANGDON FROTHINGHAM, M.D.V.**
Instructor in Bacteriology, Harvard Medical School

(From the Bacteriological Laboratory)

In the Journal of Medical Research for April, 1906, Volume XIV, New Series Volume IX, I published an article on "The Rapid Diagnosis of Rabies," in which I recommended the use of impression preparations from fresh Ammon's horn or cerebellum tissue fixed for a short time in Zenker's fluid and then stained with methylene blue and eosin. By this method the Negri bodies may be beautifully demonstrated in about one hour.

Shortly after the publication of this article Drs. Williams and Lowden, Journal of Infectious Diseases, May, 1906, Volume III, recommended the smear method of diagnosis, the smears stained in various ways, the most successful being Van Gieson's stain. This stain as then published was:

Water	10 c.c.
Saturated alcoholic fuchsin (Grübler) . . .	2 drops
Saturated aqueous methylene blue (Grübler)	1 drop

This method was communicated to me verbally in June, 1906, and since then I have used it with most excellent results in staining my impression preparations.

The impression preparation, however, has a great advantage over the smear or crushed tissue preparation recommended by Williams, namely, that the characteristic arrangement of the large nerve cells of the Ammon's horn is practically undisturbed by this method, and consequently one obtains a most excellent substitute for a section. Moreover, if Negri bodies are few in number, they will invariably be found in the large cells lying just outside the hylus. In impressions these cells are almost as readily discovered with a low power as they are in sections, and they are the first cells one should examine for Negri bodies. One looks for them in a perfectly definite situation, which of course cannot be the case in a smear preparation. In fact a successful impression preparation of the Ammon's horn is as good and usually better than a section for demonstrating these Negri bodies. The same is true to a certain extent of impressions of the cerebellum, although the Purkinje cells are not as numerous as in a section, nor as regularly distributed. Impressions of different parts of the cerebrum are also most satisfactory.

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* Read before the Laboratory Section, American Public Health Association, at Atlantic City, September 30, 1907.

† Langdon Frothingham. Zur Schnellen Darstellung Der Negrischen Kōrperchen. Zeitschrift für Tiermedizin. Volume XI, 1907, p. 378.

I have used impression preparations so frequently and so successfully with this stain of Van Gieson's that I believe it is quite unnecessary, in case Negri bodies are not found in them, to study sections. In my earlier communication I stated that, if Negri bodies were not found in impression preparations of Ammon's horn stained by the method then recommended, that it was wise to study Zenker fixed sections stained in the same way, as occasionally I had been able to find a few bodies by the section method, which had not been possible with the impressions. But since using the Van Gieson stain this has never been the case. In fact where bodies are few in number, they are not only comparatively more numerous in impression preparations stained in this manner, but are much larger and consequently more easily discovered than in Zenker fixed sections stained with methylene blue and eosin.

The method is so simple and rapid and the results so remarkable that I give it in detail, and also add my method of removing a dog's brain, as it differs essentially from the usual practice.

1. Remove the calvarium. I find a wooden mallet and the hatchet chisel (Mallory & Wright) most satisfactory for this purpose, and never use a saw on a dog's head. Having dissected back the skin and removed the muscles as close to the skull as possible, place the chisel facing downwards and at right angles to the nose, upon the anterior part of the skull, a little anterior to the point of the V, (depending upon the kind of dog,) formed by the union of the frontal and parietal bones. A few sharp blows of the mallet will suffice to crack the skull, the fissure caused thereby extending downwards and often somewhat backwards on both sides. Place the point of the chisel at the base of the fissure on one side and cut backwards through the parietal and occipital bones (the cut may go through a portion of the temporal bone). Repeat on the opposite side, and the calvarium can now easily be pulled upwards and backwards with the chisel, and removed after the muscles still holding it at the base of the occipital bone are cut with a knife. Divide the dura with scissors and lay back on either side. Stand the dog's head on its nose (the nose being placed upon a board or close to the edge of a board, which should be about ten inches square and three-quarters of an inch thick). Tilt the head slightly forward, the exposed brain being towards the operator. Gravity now draws the brain downwards and outwards, and with slight assistance of forceps and curved scissors, (first dividing the spinal cord just back of the cerebellum,) the whole brain falls out upon the board. (When the work is completed, this board, holding the dissected brain, is put into the steam sterilizer.)

2. Beginning at the olfactory bulbs divide the cerebrum and cerebellum into two halves by cutting along the median line with the scissors.

3. From one-half cut off the cerebellum close to the cerebrum; open the lateral ventricle, thus exposing the Ammon's horn.

4. Dissect out the Ammon's horn with the scissors, and remove the unnecessary tissue from the edges. Then with scissors cut out a small disc at right angles to the long axis of the organ, from any part desired, and place it upon the board near its edge, so that one of the flat surfaces of the disc rests upon the board, the other of course being exposed. The peculiar and definite arrangement of the desired nerve cells is now seen as distinct white lines.

5. Place a thoroughly cleaned slide upon this disc of tissue. Press gently and lift suddenly. (The wood being more porous than the glass the tissue invariably remains upon the board, leaving an impression of its surface upon the slide.) Repeat, using a new portion of the slide and a little more pressure. A third impression is made by using still more force, and a fourth by using sufficient pressure to almost completely flatten the disc.

6. Before these impressions have dried place in methyl alcohol for one-half to two minutes or longer.

7. Remove from the methyl alcohol and cover with Van Gieson's stain. (It is unnecessary to wait until the alcohol has evaporated.) Warm gently for one-half to two minutes, over a small flame, until a thin vapor arises.

8. Wash in water, dry with filter paper and examine without cover glass, using a low power to orient the preparation, in order to discover where the largest and best cells lie, and these are immediately examined with the oil immersion.

Naturally some impressions are better than others, depending upon various conditions. For example, perfectly firm, fresh tissue gives as a rule a poorer impression than a tissue which has become slightly softened. Also, if the brain is solidly frozen, which often is the case when animals are forwarded in winter, it should be allowed to thaw before it is removed from the skull. Otherwise it is most difficult to properly dissect out the Ammon's horn, and impressions made from it while still frozen, or immediately after it has thawed, are apt not to be good, owing to the excess of moisture.

On the contrary, if the organ has slowly melted in situ, most excellent preparations are apt to result. Moreover, all of the impressions may not be equally good. Consequently I always make four, and, as a rule, at least one of these will be so satisfactory that the entire cell arrangement of the Ammon's horn may be made out with almost as much ease as in a section, though many of the cells, of course, are crushed and broken, and many bodies may be found outside of the cells.

It occasionally occurs that in such preparations of Ammon's horn no Negri bodies can be found, yet in the Purkinje cells of the cerebellum they may be present sparingly or indeed in large numbers. Therefore, it is my practice to make in addition to the four impression preparations of Ammon's horn, two of the cerebellum, all upon the same slide, from each suspicious case of rabies, which I have to examine. Preparations from the cerebellum are easily made from the cellular portions of the organ.

Moreover, it very occasionally occurs that neither in the Ammon's horn nor cerebellum Negri bodies can be found, yet they may be demonstrated in the cerebrum. The best portion of this organ to examine in the dog is perhaps the region of the Fissura Cruciate, and impression preparations from this portion are usually very successful.

Van Gieson's stain as told me was made as above mentioned, but shortly after I began its use I observed that often the cell protoplasm was stained too intensely blue, and I found that I obtained uniformly better results by making the stain up as follows:

Water (faucet water)	20 c.c.
Saturated alcoholic solution of fuchsin . . .	3 drops
Saturated aqueous solution of methylene blue.	1 drop *

---

* Van Gieson in his article in the Centralbl. f. Bakt. Erste Abt. Bd. XLIII, Heft 2, gives his present stain as follows:

Saturated alcoholic solution of rose anilin violet	2 drops
Saturated aqueous solution of methylene blue	1 drop
Distilled water	10 c.c.m.

The stain should be made up freshly every day, as the Negri bodies fail to take up the red readily after the solution is six to eight hours old.

The Negri bodies stain from a pale pink to a purplish red and often contain numerous minute dark blue dots. The cells stain more or less blue, the red blood corpuscles not at all or are yellowish in color, rarely pinkish.

I would like to call attention to the following staining peculiarity, namely, that not infrequently the Negri bodies in the Purkinje cells stain a very pale pink, while those in impressions of the Ammon's horn, made upon the same slide and stained at the same time, are deeply stained. I have also observed this same peculiarity in the sections.

Having examined several hundred brains for Negri bodies and having tried many different methods, I recommend today above all others for the rapid staining of the Negri bodies, and, therefore, for the rapid diagnosis of rabies, Van Gieson's stain combined with my impression preparations, but in order to bring out to the best advantage the finer structure of the bodies, I prefer my earlier method, namely, Zenker fixed impression preparations stained with eosin and methylene blue.

THE DIAGNOSIS OF RABIES*

By ANNA W. WILLIAMS, M.D.

In the New York City Research Laboratory, for the past two years, or since we have used the smear method in routine diagnosis, there have been 628 cases in all examined, including suspected rabies and controls.

These are divided into two groups, the first comprising the cases sent in from outside for diagnosis only, and the second the experimental cases.

When we began the work, in order thoroughly to test the smear method in diagnosis we used comparative tests on a long series of cases, including many diseases other than rabies. The comparative tests were animal inoculations and a study of sections. The results obtained from a study of 141 cases were published in January and May, 1906, and our conclusions were that the Negri bodies as shown by smears, as well as by sections, are specific for hydrophobia, and that the smear method for examining the Negri bodies is more rapid and efficient than any other method published. Since then, in our routine work we have considered the presence of the Negri bodies in smears as diagnostic of rabies and have made no further tests except in those cases which we have used in our experimental work. Through this experimental work, however, we have added 112 cases to the list of those which had the comparative tests and our former conclusions have been more firmly established.

Before analyzing the 487 cases examined since May, 1906, it may be well to state that by Negri bodies we do not mean any indefinite cell inclusion such as those found by Van Giesen in human meningitis, or by a few others in cats' brains, or by ourselves in dog and cat distemper. The more such indefinite bodies are found in other diseases, the greater is the evidence in favor of the specificity of the true Negri bodies.

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* Read before the Laboratory Section, American Public Health Association, at Atlantic City, September 30, 1907.

Of the 487 cases, 260 are street cases and 227 experimental. Of the 260 street cases 185 showed typical Negri bodies, and 75 showed no definite forms. All of the latter and 29 of the former were inoculated into animals. The 29 all gave positive results.

Of the 75 classed under doubtful cases, 12 brains were too decomposed to show anything, 4 of these were positive on animal inoculations; 8 brains were soft and showed suspicious bodies, 2 of these were positive; 4 were in good condition and showed suspicious bodies, 2 of these were positive; the 59 remaining ones showed absolutely no suspicious bodies and all were negative to animal inoculations.

We see, then, that in all of our work controlled by careful animal inoculations we have never yet failed to have typical rabies develop in animals inoculated with material showing definitely-structured Negri bodies.

Negative results after inoculation with such material must be interpreted by us at present as due to some error in technic, such as regurgitation or hemorrhage at the time of inoculation, emulsion improperly made, not enough of the virulent material taken because of localization of the organisms, etc. Possibly individual resistance of the animal inoculated might play a part. We have used principally guinea pigs, and some of them have shown enough irregularity in regard to the time in which they have come down with the disease to suggest a varied individual susceptibility, if other factors can be ruled out. So far, however, as I have stated, we have gotten no negative results with material showing Negri bodies.

On the other hand, some material in which we have failed to demonstrate typically-structured bodies has produced rabies. All of this material, however, since we improved our technic, has shown suspicious small forms similar to those found in rabbit fixed virus. But any decomposing brains may also show in smears, bodies very similar to these tiny forms, therefore, it is difficult to rule out rabies in such cases. Such cases have become less frequent with the improved technic, and if, as we believe, the Negri bodies are living organisms, there is strong reason to hope that in time we may clearly demonstrate in smears the presence of these tiny specific forms.

Until such a time, however, animal inoculations must be used in these cases. Of course, the animal test will probably always have to be used with brains that are too decomposed to recognize any formed elements except bacteria, unless a reliable chemical test can be discovered.

So far with us fresh brains showing no Negri bodies and no suspicious forms have not produced rabies, but a few observers have claimed that such material has produced the disease. Therefore, until we can standardize our technic we must in all such cases use animal inoculations. We may, however, be reasonably certain that a case showing such negative material was not a case of rabies.

It is possible that some of these doubtful cases if killed early in the disease, before there has been time for general development of the virus in the brain, may have virulent sputum. The virulence of the sputum is said to be due to the passage of the virus through the salivary glands. We are now carrying on a series of experiments to test the comparative virulence of these glands and the brain in true and doubtful cases. Our results are yet too few to be tabulated.

We have already had an interesting case in which this method was apparently helpful. A Russian wolfhound with a typical symptoms of dumb rabies was sent in for diagnosis. The brain showed many small fixed virus-like forms, which were considered suspicious. Guinea pigs were inoculated from brains and glands. Treatment was begun in a small child whose scratched hand had come in contact with the saliva. After twelve days, as no symptoms were observed in the guinea pigs, the treatment was discontinued. The pigs from the brain came down six and one-half weeks after the inoculation, while those from the glands are still alive ten weeks later. It was decided not to give more treatment to the child for this reason.

The question as to whether the sputum may be virulent and the glands not, is an interesting one. It has been stated that the secretions from the mucous membranes of the mouth and naso-pharynx may also be virulent. If this were so, it would of course throw out negative results from gland inoculations. We are attempting also to solve this question.

The localization of the Negri bodies is another important point in making diagnoses. We have found well-developed bodies distinctly localized in different parts of the brain in several instances. In one horse there were small widely-scattered areas of well-structured forms throughout the cerebellum, while tiny, indefinite forms were scattered through the rest of the brain examined.

In two human brains well developed forms were found in the corpus stratum and not in the rest of the brain. In several dogs the localization has also been marked.

The technic of our smear method is as follows:

1. The smears are made by pressing between a glass slide and a cover glass a small, thin section of the gray matter from (*a*) the cerebral cortex, (*b*) Ammon's horn, or (*c*) the cerebellum; the material is spread along the slide by moving the cover glass down with the finger.

2. When partly or completely air-dried the smears are fixed for about ten seconds in neutralized* methyl alcohol to which one-tenth per cent of picric acid has been added. The excess of the fixative is removed by blotting with fine filter paper.

3. The fixed smears are stained in the following solution:

Saturated alcoholic solution of fuchsin	1 drop
Saturated alcoholic solution of methylene blue	5 drops
Distilled water	10 c.c.m.

NOTE. — This solution, which is a modification of the one proposed by Van Gieson for staining the Negri bodies in smears, changes rather quickly at room temperature, but kept in the ice-box it gives good results for an indefinite time.

The stain is poured on the smear and held over the flame until it steams. The smear is then washed in tap water and blotted with fine filter paper.

With this stain the Negri bodies appear a magenta, the nerve cells blue, and the red blood cells yellow or salmon colored.

The following is the routine method of handling our material:

If the material is fresh, smears are made from the three parts mentioned in the slips and according to the method described there. If nothing is found, smears are made from various other parts of the brain. If still nothing is found, and emulsion is made of good-sized pieces from the different parts of the brain and intracerebral inoculations are made into three guinea pigs, about one-fourth c.c. of the emulsion is inoculated. An emulsion is also made of the different parts of the brain in glycerine for later inoculations, if for any reason the first should fail. Sterilized, neutral glycerine is used. These emulsions remain active in the ice-box for over three months.

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* The wood alcohol is neutralized by adding sodium carbonate ($Na_2 CO_3$) about .25 gms. to 500 c.c. of the alcohol.

Contaminated, doubtful material is made into a weaker emulsion in order to lessen the number of bacteria.

The glycerinated emulsion made from part of the same material is inoculated after two weeks, unless positive results have been gotten from the weak emulsion.

THE DETERMINATION OF INTESTINAL BACTERIA IN MILK*

By DANIEL D. JACKSON
Mt. Prospect Laboratory, Brooklyn, N.Y.

A demonstration of the value of the lactose-bile medium for tests of intestinal bacteria in water has led to its use in the determination of the amount of contamination by fecal matter in milk. The fermentation test, using dextrose broth, gives utterly unsatisfactory results with milk, but the restraining action of lactose-bile solution on the growth of species other than B. coli admits of the use of the latter medium. This solution cuts out the growth of the other gas formers and stops the overgrowth caused by the more rapid multiplication of other bacteria, together with the consequent detrimental products of their metabolism.

The medium is prepared by sterilizing fresh undiluted ox bile directly after being drawn from the animal. It should first be tested for acidity. This is best done by adding ten cubic centimeters of bile to ninety cubic centimeters of distilled water, boiling for about one minute and titrating with twentieth normal sodium hydrate, using a few drops of phenolphtalein as an indicator.

The final endpoint is best found by examining the edge of the liquid in the six-inch porcelain dish for the appearance of the pink color. If more than four cubic centimeters of the twentieth normal sodium hydrate is required, the acidity is more than 20 by the Fuller scale and the bile should be rejected as unfit for use, as neutralization does not remedy the defects caused by previous bacterial action. The usual and best acidity is about 5 Fuller scale.

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* Read before the Laboratory Section, American Public Health Association, at Atlantic City, September 30, 1907.

The sterilization is best made in two-quart bottles, in an autoclave for 30 minutes at 15 pounds pressure. If gallon bottles are used, 45 minutes are required. By this sterilization the ropy consistency is changed and the albuminous material settles to the bottom of the bottle. These bottles of the sterilized bile are then kept in the ice chest.

When ready to be used the watery fluid is decanted and the last portion filtered through cotton. One per cent of lactose previously dissolved in a small amount of hot water is added and thoroughly mixed and the fermentation tubes are filled with the fluid. The tubes are then plugged with cotton and sterilized, taking care to raise and lower the temperature slowly, so as not to cause foaming and consequent blowing out of the plugs.

The fermentation tubes used are 140 mm. long and 15 mm. in diameter, having an elongated bulb 38 mm. in its shortest diameter. This admits of the addition of 10 c.c. of the milk to be tested without too great a dilution of the medium. They are set in copper racks, holding twelve tubes, having six on each side, back to back.

If, instead of using the liquid medium for keeping and transporting purposes, the solid is preferred, the decanted and sterilized bile may be evaporated to dryness and kept in tightly corked jars. In this case 110 grams per liter is used to make up the liquid media.

Contrary to expectation, it has been found that under ordinary conditions, considerable numbers of other bacteria being present, *B. coli* does not increase in milk, or if so only to a very slight extent and then gradually dies out. On this account the amount of the original contamination may be determined.

The dilutions required for the test fall within the same lines as in water analysis. Amounts of one-tenth, one and ten cubic centimeters of milk are added to the fermentation tubes and incubated for two days at 37½ degrees centigrade.

If *B. coli* is present, gas will be formed, usually in two days, which will occupy at least twenty-five per cent of the length of the tube. In tubes where the gas is almost twenty-five per cent on the second day, the third day test is used.

Attention should be called to the fact that at an incubation temperature of 40° C. the lactose-bile test is *not* properly developed in testing either water or milk.

A clean milk, or one that has been pasteurized, rarely gives positive tests in ten cubic centimeters.

A milk that has been carelessly handled gives the test in one cubic centimeter and sometimes also in one-tenth of a centimeter.

A contaminated milk gives positive tests in all three amounts taken, and the positive results may at times be obtained even in much higher dilutions.

THE RELATIVE VALUE OF DEXTROSE BROTH, PHENOL BROTH AND LACTOSE BILE AS ENRICHMENT MEDIA FOR THE ISOLATION OF *B. COLI.*

By S. C. PRESCOTT and C-E. A. WINSLOW

From the Biological Laboratories of the Massachusetts Institute of Technology

One serious drawback to the use of dextrose broth for preliminary enrichment in the isolation of *B. coli* has long been recognized. This drawback lies in the fact that the organism, when present in the enrichment tube, is occasionally overgrown by other forms and fails to appear upon the litmus-lactose-agar plates inoculated from it. In order to obviate this possibility the use of phenol broth has been suggested, in the hope that phenol would check the growth of the interfering forms without inhibiting the colon bacillus itself. With highly polluted waters the phenol broth method sometimes works successfully, permitting the isolation of *B. coli* when the dextrose-broth method fails. Phenol is, however, inimical to the colon bacillus as well as to other forms, and when only a few of the intestinal organisms are present they often fail to develop. Irons (1901), in the examination of 119 samples of waters, not heavily polluted obtained 56 positive results with dextrose broth and only 37 with phenol broth.

When Jackson (1906) suggested the use of lactose bile as an enrichment medium it was hoped that a more definite selective action would be attained. It was claimed that the bile medium would actually favor the increase of *B. coli*, while retarding the growth of streptococci and killing off most other body temperature forms. Jackson (1907) and Sawin (1907) report good results from the use of lactose bile.

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* Read before the Laboratory Section, American Public Health Association, at Atlantic City, September 30, 1907.

There is little doubt that with sewage or very highly polluted waters the bile medium often shows the presence of gas-forming organisms which are entirely lost in dextrose broth. Sawin's work and that of Longley and Baton (1907) both bear out this view. In less heavily polluted waters, such as those with which we are ordinarily concerned in bacteriological water analysis, conditions are different. The danger of overgrowth is less serious and the likelihood that the few *B. coli* present may not develop in lactose-bile is greater. Longley and Baton (1907), from their work on Potomac water, conclude that "the value of the test with the bile lactose on unpolluted or slightly polluted water, such as we have to deal with the greater part of the time, is uniformly less than with dextrose broth, except in the larger quantities of water." Sawin's tables show the same phenomenon. Although he states in the text that with waters of good quality there is little difference between the two methods, his figures show for wells and lakes 11 per cent of positive results in 1 c.c. with dextrose broth and only 4.3 per cent in lactose bile.

Sawin's argument for the lactose-bile medium rests on a comparison of presumptive tests alone, typical gas formation in lactose bile and dextrose broth, respectively, being considered positive. Various observations during the last few years have tended, however, to throw doubt upon the value of the presumptive test as an indication of the presence of *B. coli*. It appears probable that gas formers other than *B. coli* may frequently be found in waters which are not sewage polluted. The crucial test of the two methods can only be made by isolating sub-cultures, working them out in detail, and comparing the number of positive results in the two cases. Weston and Tarbett (1907) report the result of such an examination of sixty-three samples of water. Eighteen gave no gas formation with either medium and twenty-four gave gas with dextrose broth, but not with bile; of these latter one showed *B. coli.* Eighteen samples gave gas with both media, and five in each case showed typical *B. coli.*

During the past spring and summer 176 samples have been examined in this manner under our direction in the laboratories of the Massachusetts Institute of Technology, and the results throw some additional light upon the comparative value of the bile and dextrose broth enrichment processes. The samples were in all cases collected from surface sources, streams, ponds and pools which were more or less subject to pollution, exactly the sort of samples of which a bacteriological examination is most commonly desired. In each case one cubic centimeter portions of the sample were incubated in three enrichment media, dextrose broth, lactose bile and either lactose broth or phenol broth. Gas formation was recorded for three days and as soon as gas appeared litmus-lactose-agar plates were made and subcultures isolated and identified by the standard procedure of the American Public Health Association (except that motility was not determined).

We have arranged our results in four general groups. Positive results are those in which typical *B. coli* were isolated and negative results those in which no gas was formed in the enrichment medium. Atypical results are recorded when organisms were isolated which produced gas in dextrose broth and acid in lactose agar, but failed to give the reactions of *B. coli* in milk, peptone broth, nitrate solution or gelatine. The term "gas formation" has been used to designate that case in which gas formation in the enrichment medium was followed by negative litmus-lactose-agar plates. It may obviously be due to one of three causes, either to the development of a colon-like organism in the enrichment medium which is so overgrown as not to appear on the plate, or to the presence of a form which produces gas in dextrose broth but no acid in lactose agar, or to the presence of forms which symbiotically ferment, and alone do not. In thirty-five cases this point was determined by reinoculating from the blue plates into the original enrichment medium. In thirty-one out of the thirty-five cases gas was again produced, showing that we had generally to deal with a form which fermented dextrose broth but formed no acid in lactose.

The first series of samples were collected and examined by Mr. H. R. Crohurst during the months of April and May, and the sum total of his results with each enrichment medium is as follows. With dextrose broth he obtained 25 positive results and 19 negative results; in 21 cases gas formation was followed by negative lactose-agar plates and in 3 cases atypical forms as above defined were isolated. With phenol broth he obtained 18 positive and 17 negative results; in 17 cases gas formation was followed by negative lactose-agar plates and in 3 cases atypical forms were isolated. With lactose bile he obtained 21 positive and 39 negative results; in only 7 cases was gas formation followed by negative lactose-agar plates, and one atypical form was isolated.

The second series of samples were collected and examined by Mr. A. F. Stevenson, also in April and May, 1907. With dextrose broth he obtained 12 positive and 21 negative results; in 11 cases gas formation was followed by negative lactose-agar plates and 8 atypical forms were isolated. With phenol broth he obtained 16 positive and 30 negative results; in 5 cases gas formation was followed by negative lactose-agar plates and one atypical form was isolated. With lactose bile he obtained 11 positive and 37 negative results; in only one case was gas formation followed by negative lactose-agar plates and three atypical forms were isolated.

Summing up these two series it appears that dextrose broth yielded 37 positive results, phenol broth 34 and lactose bile 32. There is, therefore, no evidence here of any advantage from the use of the two media of special inhibiting power.

The third series of samples were collected and examined by Mr. W. C. Folsom during June and July of 1907. He used for enrichment, dextrose broth and lactose bile as in the two first series, but for the third medium he used lactose broth instead of phenol broth. Everything in this series was done in duplicate, two tubes of each enrichment medium being inoculated and cultures worked out in detail from each. The effect of this procedure was to decrease materially the number of samples failing to give positive or negative tests. In many cases a negative lactose-agar plate was obtained after gas formation from one tube, while the plate from the duplicate tube yielded *B. coli;* often, too, after both lactose-agar plates were positive, one culture would prove atypical and the other typical. With dextrose broth, Mr. Folsom obtained 33 positive and 16 negative tests; in 6 cases gas formation was followed by negative lactose-agar plates and a single atypical result was recorded. With lactose broth he obtained 34 positive and 14 negative tests; in 7 cases gas formation was followed by negative lactose-agar plates and one atypical test was recorded. With lactose bile he obtained 32 positive and 22 negative tests; in one case gas formation was followed by negative lactose-agar plates and 1 culture proved atypical. A comparison of these results with those of the two preceding series shows clearly the advantage of duplicate determinations in eliminating dubious results.

The media employed in all these experiments were prepared in accordance with the formulæ of the American Public Health Association Standard Methods Committee, or of the authors who suggested the use of the particular media in question.

Comparing the lactose and dextrose broths used in this series it appears that the results are practically identical.

The results for dextrose broth and lactose bile in all three series have been added and tabulated in Table I. "Gas formation," as noted above, means that gas was formed in the enrichment medium, but that lactose-agar plates were negative. A negative result means that no gas was formed. "Atypical" means that a fermenting organism was isolated which failed to give *B. coli* reactions in milk, peptone solution, nitrate solution or gelatin.

TABLE I.

COMPARATIVE RESULTS OF *B. COLI* ISOLATION DEXTROSE BROTH AND LACTOSE-BILE

RESULT	NUMBER OF SAMPLES	
	Dextrose Broth	Lactose Bile
Positive	70	64
Negative	56	98
Atypical	12	5
Gas formation	38	9
Total Samples	176	176

These results seem to indicate that for waters which are not heavily polluted the lactose-bile medium is on the whole inferior to dextrose broth as an enrichment medium. It does indeed prevent the development of the organisms which cause overgrowth and of the gas formers other than *B. coli.* Thus the proportion of cases in which gas formation was followed by negative litmus-lactose-agar plates was materially decreased, as was the proportion of atypical cultures isolated. The bile medium, however, is also inimical to the colon bacillus itself, and the net result of its use with waters of this class is to diminish appreciably the number of positive isolations.

The use of the bile medium saves the bacteriologist from the trouble of replating a certain number of samples which, when replated, show only negative results. This occurred in 36 out of 176 samples in the work reported. Against this advantage must be set the longer time required for incubation in the bile medium. In dextrose broth when gas was formed it appeared in 66 per cent of the tubes in one day and in 97 per cent in two days; in phenol broth gas appeared in 52 per cent of the tubes in one day and in 98 per cent in two days; in lactose bile gas appeared in only 16 per cent of the tubes after one day, in 73 per cent after two days and in the remaining 27 per cent only after three days. Finally the fact that a certain percentage of samples containing *B. coli* gives negative results with lactose bile and a positive test with dextrose broth must be considered a serious drawback, even though the percentage is a small one.

In this discussion we have considered the bile medium only as a preliminary enrichment medium in the process for the complete isolation of *B. coli*. For this purpose, it is inferior to dextrose broth. As a presumptive test, when the full working out of *B. coli* is impossible, the bile medium offers distinct advantages. If the proportion of cases in which *B. coli* was actually isolated (70 out of these 176 samples) be taken as 100, the percentage of complete, positive results, using bile for preliminary enrichment, was 91. If the dextrose broth fermentation test alone had been considered positive, 120 "presumptive" tests would have been obtained, or 171 per cent of the real number. On the other hand, the positive presumptive tests in bile, considering all gas formation as positive, would have given 78 positive results, or 111 per cent, only slightly in excess of the true value. As a presumptive test, the lactose-bile medium seems to yield a fair approximation to the truth, being far superior in this respect to dextrose broth.

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PRESERVATIVES IN FOOD AND THE EFFECT THEREOF ON THE PUBLIC HEALTH *

By DR. H. W. WILEY,
Washington, D.C.

It is well known that there is a wide difference of opinion among experts respecting the effect of certain chemicals added to foods as preservatives upon health. As is natural in such cases, there are two sides to the question, and it is attacked constantly from two points of view. The medical officer of health naturally looks at the use of preservatives solely from the effect which they have upon health; the manufacturer of food products looks at the use of preservatives solely from its relation to manufacture and trade. There is a third point of view which should be occupied by experts who look at the subject from a purely scientific point of view, that is, men who are not interested officially in conserving the public health, nor in any commercial way, in manufacturing. It is not meant in this paper that because a man is interested professionally in one side of a question, he fails to see the merits of all sides, nor is it maintained that the unbiased expert is any more able than either of the others to discuss the subject. The only contention in this case is that the report of the unbiased expert is likely to have more weight with the community, or with the court, than the testimony of the other experts, conceding that they all have equal merit. That experts should honestly arrive at opposite conclusions is not any matter of astonishment. The methods of conducting the investigation, the subjects on which the experiment is conducted and the points which are kept

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* Read before the Laboratory Section, American Public Health Association, at Atlantic City, September 30, 1907.

principally in view, the time over which the investigation is conducted, the quantities of the materials experimented with, all have their effect. The particular experimental work which is set forth in this paper was undertaken to show that a certain beverage, namely, cider, which is very commonly preserved in this country by the addition of benzoate of soda, might be manufactured of a better and superior quality, and kept without the addition of any preservative whatever. The work was conducted under my instructions in Nebraska, by one of my assistants, Mr. H. C. Gore. A detailed account of the experimental work is contained in his report, in which it is shown that, by the selection of the proper kind of fruit, by care in the crushing of the fruit and the expression of the juice, by passing the juice twice through a cream separator, and by sterilization, cider of extraordinary good quality was secured which, when enclosed in sealed cans, keeps indefinitely. It is also shown that it keeps for a very long time in barrels and other wooden containers, and, therefore, that the claims made by the manufacturers of this line of goods that cider cannot be made without the use of a preservative are baseless. As an addendum to this work, statistics are given of the opinions of experts on the advisability of using preservatives in foods.

In order to obtain the views of eminent physiologists and hygienists, health officers and physicians in the United States as to the propriety of using preservatives in foods, a list of questions was sent out from the Department of Agriculture, to which a large number of replies was received. These questions and the replies have been tabulated as follows:

1. Are preservatives, other than the usual condimental preservatives, namely, sugar, salt, alcohol, vinegar, spices and wood smoke, injurious to health?

Affirmative	218
Negative	33
Total	251

2. Does the introduction of any of the preservatives which you deem injurious to health render the foods injurious to health?

Affirmative	222
Negative	29
Total	251

3. If a substance added to food is injurious to health, does it become so when a certain quantity is present only, or is it so in any quantity whatever?

Affirmative	169
Negative	79
Total	248

4. If a substance is injurious to health, is there any special limit to the quantity which may be used which may be fixed by regulation or by law?

Affirmative	68
Negative	183
Total	251

5. If foods can be perfectly preserved without the addition of chemical preservatives, is their addition ever advisable?

Affirmative	12
Negative	247
Total	259

It can be readily seen from this tabulation that the opinions expressed point overwhelmingly to the fact that preservatives as a class are injurious to health, and hence their use is, under the act, inhibited.

Other data are also given showing that the very commonly expressed opinion among manufacturers that chemical preservatives are a necessity to the trade is recognized. The relation of this investigation to the public health is patent. It is not claimed that chemical preservatives in any case are food products. If they take any part in metabolism, their influence is to disturb the normal processes unfavorably. They place upon the excretory organs an additional burden. Benzoic acid or benzoate of soda, the preservative specifically mentioned, is changed in the metabolic process principally into hippuric acid, thus adding an additional destructive product to the fluids of the body, the elimination of which is at once required to avoid the poisonous effects which it otherwise would produce. The trend of the argument is to show, therefore, that chemical preservatives have no place in food products.

THE OPHTHALMO-TUBERCULIN TEST:

A New Diagnostic Method in Tuberculosis *

By EDWARD R. BALDWIN, M.D.
Saranac Lake, N.Y.

As a result of v. Pirquet's studies on secondary or revaccination, a new test for tuberculosis was introduced by him into the children's hospitals of Vienna and Berlin. The observation that the primary vaccination was followed by the slowly-developing pustule of vaccinia, whereas the secondary, — while the immunity existed, — pursued a rapid course with hyperemia, swelling and the formation of a transient papule without the actual infection of vaccinia, led v. Pirquet to see the analogy in these phenomena to those of other diseases. The classic experiments of Koch, which led to the discovery of tuberculin, are readily recalled in this connection. He noted that reinfection of tuberculous guinea pigs was not easily produced and the course was entirely different from the first. Marked local reaction and swelling occurred at the site of inoculation without the involvement of neighboring glands. This was accompanied by evidences of general reaction and other changes which led to the experiments with dead bacilli and ultimately the extract known as tuberculin for therapeutic and diagnostic use. v. Pirquet's experiments were made with scarifications of the skin as in vaccination, into which tuberculin (not tubercle bacilli) was rubbed. A hyperemia and swelling followed in tuberculous children which was absent in the non-tuberculous, and constitutional disturbance was generally absent in the tuberculous. In 360 tests it was found to be

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a pretty reliable diagnostic criterion in children under two years of age. Unfortunately, older persons reacted more or less in all cases, and animal experiments were similarly unsatisfactory in the hands of Arloing, Vallée and Guerin.

On the basis of the cutaneous test the suggestion was made independently by Dr. Wolff-Eisner of Berlin, and Professor Calmette of Lille, France, that the conjunctiva might furnish a favorable field to exhibit the reaction without the necessity of scarification. The white background of the ocular conjunctiva indicates slight changes of hyperemia, owing to the rich supply of vessels and gives a quick response to irritants, hence if tuberculin susceptibility is present the eye would be expected to reveal it to advantage, and with greater delicacy.

In the preliminary tests made on hospital patients this was found to be true by Calmette and Letulle. To avoid the irritant action of glycerine and other substances such as beef salts contained in the old tuberculin they employed a precipitated, dry tuberculin redissolved in water. The precipitate was obtained by adding 95 per cent alcohol to the old tuberculin which, when washed and dried, was used in 1 per cent solution, one drop being instilled into the eye. A reaction occurred in all tuberculous patients save those in the last stages, and in none who were suffering from other diseases. About four hundred cases have been reported thus far, including all ages and diseases. Professor Comby of Paris reports 132 children tested with 0.5 per cent solution. Of 62 who reacted, post-mortem examination confirmed the diagnosis of latent tuberculosis in 6. Of the 70 who did not react, absence of tuberculosis was claimed for 4 who came to autopsy.

THE REACTION. After the instillation of tuberculin no perceptible irritation follows in the majority of healthy persons unless the strength of the solution is greater than that above mentioned. In individuals who are tuberculous at the time, or those who have recovered from a previous attack but still retain susceptibility, a scratchy feeling with secretion and redness of the palpebral conjunctiva and inner canthus develops in from 3 to 24 hours, and, in a few instances, as late as 48 hours. Exudation of leukocytes which gather into fibrinous or purulent collections occurs in moderately severe reactions, while in the most severe ones, edema of the lids, deep congestion of both palpebral and ocular conjunctiva develops, with considerable discomfort, though severe pain is absent. After reaching its height, in from 12 to 24 hours, the reaction gradually subsides in the majority of cases in 3 days; severe reactions may exhibit swelling 4 or 5 days and redness for a week. Coryza of the nasal passage on the tested side has been noted in a few cases. No harm has yet resulted from the test and no change in the interior structures of the eye has been noted in my tests. No fever or local reaction in the tuberculous tissues has accompanied the eye reaction thus far.*

ITS EXPLANATION. The explanation of the specificity of this reaction is closely connected with the phenomena of anaphylaxis, which have been studied with such fruitful results by Rosenau and Anderson, Gay and others. When the cells of an animal have been subjected to the influence of foreign proteids, whether in the form of bacterial substances produced in spontaneous disease or purposely injected, there occurs a profound change in the functions and behavior of the cells to a subsequent exposure to the same substances; the cells become sensitized and indicate this by a series of reactive phenomena, which range all the way from a local hyperemia and leukocytosis to grave multiple extravasations of blood and fatty changes with collapse and death. The response thus created is a manifestation of resistance which is not equivalent to immunity yet is a phase of it, which may be judged valuable in warding off harm when exposure to natural external infection is encountered.

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* More recently several cases of phlyctenular conjunctivitis and keratitis, especially in scrofulous children, have been reported by various authors which should argue caution in its use.

In tuberculosis the extreme sensitiveness to tuberculin is well known; it is indicated by the rush of leukocytes and exudation to the site of injection as well as to the periphery of the tubercles. Hence, individuals who have received enough infection to acquire a specific sensitiveness will exhibit the reaction in the conjunctiva to a greater or less degree.

The amount and duration of the sensitiveness is dependent on unknown factors, but we know that wide differences occur in different individuals, with disease of apparently equal extent. Reactive power is indeed more prominent in the earlier or latent stages, while in acute, disseminated types and the advanced stages it is often weak or absent.

The possibility of a non-specific susceptibility in the absence of the infection must be considered in some individuals who manifest idiosyncrasies in skin eruptions and rashes.

CONTRA-INDICATIONS. Any existing disease of the eye or lids, conjunctivitis, blepharitis, trachoma, keratitis and iritis should be deemed sufficient reason to contraindicate the test. Eye strain from errors of refraction need not prevent its use so far as present experience is an indication. The tested eye should be kept from external irritation, such as rubbing, wind, dust or smoke.

METHOD AS APPLIED BY THE WRITER. A quantity of concentrated old tuberculin is poured into two volumes of 95 per cent alcohol and the precipitate allowed to settle. It is then filtered and the sediment washed with 70 per cent alcohol until the filtrate is clear. The sediment is pressed between folds of filter paper, scraped off and dried over H_2SO_4 in vacuo. The lumps are powdered under a hood to avoid inhaling the dust and quantities of one per cent by weight are dissolved in normal saline solution, boiled, and any precipitate filtered. A portion is diluted one-half or two-thirds according to the reactive strength as ascertained on tuberculous patients, this being the only means of standardization.* The solutions are finally sealed into glass tubes, each containing a few drops, and boiled for ten minutes to insure sterility.† Any further precipitate is easily centrifugalized to one end before opening the tubes by breaking them at a file mark in a clean cloth; crumbs of glass are to be avoided in this procedure. The writer made use of two solutions which contained .33 per cent (No. 1) and .5 per cent (No. 2) respectively of the tuberculin, which in the preparation used seemed to be too strong in 1 per cent solutions. When No. 1 failed to produce a reaction, No. 2 was instilled into the other eye after twenty-four or forty-eight hours, thus avoiding unnecessarily severe reactions, and giving greater delicacy to the diagnostic test.

It appeared advantageous also to use a definitely measured drop, and for this purpose a calibrated eye dropper fitted with a Wright's "throttle" tube was adopted, which was graduated to .025 c.c. By holding the eyelid down until the drop spreads around the sac this amount is easily retained without overflowing on the cheek. It should not be instilled cold, and the dropper should be cleansed with alcohol and salt solution before use, to avoid accidental contamination. The same eye should not be tested twice in succession, as there is some evidence to show that it becomes sensitized by the first test; this, however, requires further study.

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* The advantage of making up a large stock for continuous use is obvious, as it does not deteriorate readily.

† Small capillary tubes like those employed for vaccine might be adapted to contain enough for one test.

The following schema was adopted for the purpose of recording reactions and comparing results:

SCHEMA FOR RECORDING REACTIONS

NEGATIVE:	No difference in color when lower eyelids are pulled down and compared.
DOUBTFUL:	Slight difference with redness of caruncle.
X	Distinct palpebral redness with secretion.
XX	Ocular and palpebral redness with secretion well marked.
XXX	Deep injection of entire conjunctiva with edema of lids, photophobia and secretion.

CLINICAL OBSERVATIONS. The observations thus far made by the writer and his colleagues are here simply summarized, as the publication of a detailed study is contemplated later.

One hundred and thirty-seven persons have been tested, five of whom were controlled by the subcutaneous test. Of 45 tuberculous patients in all stages, 42 reacted positively, 1 was doubtful, and 1 advanced miliary and 1 tuberculin-treated were negative. Of 9 healed tuberculous persons (1 to 17 years healed), 8 reacted and 1 was doubtful. Of 26 individuals suspected because of history, symptoms or physical signs, 8 reacted positively, 4 doubtful and 14 negative. Of 57 supposedly healthy persons, 16 reacted, 8 of whom gave a family history of tuberculosis, 6 of close contact with tuberculous persons, and only 2 in which no such history was obtained. Among the 41 who did not react 20 were farmers and guides living in the open air; most of the others were in contact with tuberculous patients. In general the results correspond to those obtained with the subcutaneous test. Of the 6 who were thus tested all were negative to both tests save one who was known to have lues and reacted to .005 c.c. tuberculin. The figures with supposedly healthy people are not different from those obtained with the subcutaneous test, but idiosyncrasies must possibly be considered as playing some part in causing reactions until further experience and post-mortem observations shall establish the limits of specificity. Should it prove to be only one method of confirming the diagnosis of a suspected tuberculosis, and even then with but three out of four chances of accuracy, it will approach in value the subcutaneous test or the Widal test for typhoid.

Considering that individuals with clinically-healed tuberculosis may give a reaction for an indefinite time, the test cannot at present be taken as a criterion either of healing or of the presence of active tuberculosis when no symptoms of this exist. Considerable care is therefore required in interpreting a positive reaction and, on the other hand, a negative result cannot now be asserted to exclude the presence of the disease.

In the general adoption of such simple methods great judgment is needed to avoid unnecessary alarm, especially to members of tuberculous families who have no symptoms of the disease, yet who may be found to react readily to this test. While thus capable of sounding a warning note to those who need it, sensitive persons might overestimate the importance of a slight infection or a long latent disease, which has little chance of becoming active.

The Massachusetts Association of Boards of Health

JANUARY QUARTERLY MEETING

Boston, Mass.

The quarterly (and annual) meeting of the Massachusetts Association of Boards of Health was held at the Brunswick Hotel, Boston, Thursday, January 30, 1908. The President Dr. H. P. Walcott, presiding.

THE PRESIDENT. The first paper will not be presented by Dr. Thorndike, who is obliged to go South on account of his health, but Dr. Wilson has kindly offered to present the paper which Dr. Thorndike would have presented had he been here.

A FEW REMARKS ON THE PREVALENCE OF VENEREAL DISEASE

By **LOUIS T. WILSON, M.D.**
Boston

The following points will be briefly considered in this short paper.

1. The frequency of venereal disease.
2. The ignorance of the public as regards the seriousness of venereal disease.
3. The chance of innocent infection.
4. The bearing of venereal disease on the general health of the infected individual both as to present condition and to the future and its relation to marriage and heredity.

Venereal disease is the most common of all adult diseases, and none is more insidious or far-reaching in its after effects. Considered as a social danger, it seems to be on the increase in contrast to a number of diseases where progress has effected an undoubted decrease.

It is, of course, impossible to determine the actual number of persons suffering from venereal disease, but it must be very large. The lowest estimates in recent literature state that at least seventy-five per cent of the male inhabitants of our cities have gonorrhœa at some time in their life. Morrow remarked in 1901 that there were over two hundred thousand people infected with venereal disease walking the streets of New York City. French statistics state that from five per cent to twenty per cent of the male inhabitants of the larger European cities are infected with syphilis. The Surgeon General of the United States Navy reports that in the year 1905 gonorrhœa stood second and syphilis fifth as a cause for hospital admission, the order being tonsilitis, gonorrhœa, wounds, bronchial affections, syphilis. He comments on venereal disease as follows:

"Venereal disease caused a decided loss of efficiency with 6,154 admissions, which is an increase of 631 over the admissions for 1904. The admissions for this disease show only approximately the prevalence of venereal infection in the Navy, owing to the fact that a large number of cases of gonorrhœa are not admitted to the sick list and hence are not included in the statistical reports. Venereal disease gives a total of 127,286 sick days which is equal to the entire loss of the services of 348 men for the year."

The Surgeon General of the United States Army in his report for the same year says: "Venereal diseases were again by far the most important affecting the efficiency of the army during the year. These diseases were first with admissions to hospital, discharge, and non-effectiveness, causing nineteen per cent of all admissions, fifteen per cent of all discharges, and thirty per cent of all non-effectiveness for disease. There were constantly on sick report for this class of disease 710 men, equal to the loss for the entire year of the service of about eleven full companies of infantry. The increase noted in all the rates, except that for discharge, for venereal disease indicates a most unsatisfactory condition." "The admission rates in the American Army were higher than in any other army in the following: alcoholism, dysentery, gonorrhœa and syphilis. (British Army excepted in syphilis.)"

The public does not realize that gonorrhœa is not only a local disease but in many instances a systemic disease attacking almost every structure of the body, the gonococci being carried through the lymphatics and deposited in the various serous membranes. The duration of gonorrhœa depends on the longevity of the gonococcus, and this organism may live for years after its introduction into the body. The anatomical structure of the genito-urinary system affords many hiding places. During the course of a gonorrhœa, the gonococci may penetrate into the many crypts and glands of the urethra, setting up an inflammation. They may continue to propagate within these cavities for months after inflammation has ceased on the free surface of the urethra, only to escape at some future time with the resulting infection of wife or mistress. Posterior infection which occurs in eighty per cent of all cases, generally results in an infection of the prostate, seminal vesicles or testicles. Such an infection is the chief cause of chronic gonorrhœa. Its cure even by the best treatment is a long, slow process, and in many cases it is impossible to effect a cure. Most men regard gonorrhœa as a simple affair to be treated only so long as the disease inconveniences them. When the discharge has ceased they regard themselves as cured. This belief is fostered by the large number of advertising quacks who guarantee to cure all venereal disease in a marvelously quick time; by druggists and manufacturing chemists, who sell a sure cure, and also, I am sorry to say, by physicians who from an unwarrantable ignorance of the symptoms of an uncured gonorrhœa or from a careless examination, discharge their patients as cured. A large number of chronic gonorrhœas cause the patient little or no inconvenience. The morning drop or mild gleet is not regarded as infectious and in consequence the patient resumes his usual life, ignorant or careless of the fact that he is carrying in his system latent gonococci waiting for a chance to be planted in a fresh soil, there to start a new infection and add one more to the already long list of cases. Morrow reports a case of contagion four years after infection and one after six years.

Syphilis is looked upon by the public as a more serious disease than gonorrhœa and pursuing a longer course. This is due to the duration of primary and secondary symptoms, but attention is often paid to the disease only so long as the primary lesion is observable or disfiguring complications are present. They know little about the fact that the blood is infectious for years, and it is hard to convince them that treatment is necessary for a long time after all symptoms have gone.

As a result of the ignorance of the serious nature of venereal disease, the chance of innocent infection is great. Gonorrhœal infection requires a transference of some of the discharge; almost always by sexual intercourse, yet occasionally by use of contaminated towels, syringes, bed linen, bath tubs, and in the case of children from occupying the same bed with an infected member of the family. Gonorrhœal vaginitis is not uncommon among little children.

Sara Welt-Kakels, in her clinic at Mount Sinai Hospital, New York, from 1893 to 1903, reports that 1.6 per cent of all cases treated had vulvo-vaginitis mostly of gonorrhœal origin. In 1890 there occured in Posen, Germany, an epidemic of vulvo-vaginitis in which 236 school-girls were infected. They had all used the same bathhouse and owing to limited accommodations several children bathed in the same tub. The danger of contagion, even in hospitals where the utmost vigilance is observed, is well shown by Emmet Holt. In 1902 at the opening of the Babies' Hospital, New York, a child suffering from gonorrhœal vaginitis was inadvertently admitted. From this child there developed in the wards eleven new cases.

Syphilis has a much larger field of contagion. Not only can it be conveyed by transference of discharge from the primary sore and other manifold lesions in the body, but also by the blood of the infected person. Besides sexual intercourse it may be conveyed by means of spoons, knives, forks, cups, pipes, towels, kissing, etc.

The bearing of venereal disease on the general health of the affected individual, both as to present condition and to the future and its relation to marriage and heredity, is little thought of. Gonorrhœal infection of the prostate and vesicles may be followed by a long train of nervous symptoms. Epididymitis when double results in sterility. Morton states that ninety per cent of sterility in the male is due to gonorrhœa. Luer and Asher calculated in cases where both parties were examined that the husband contributed 59.1 per cent to the sterile condition. Gonorrhœal arthritis is a common sequela. Cole says that in 1905 gonorrhœal arthritis was more frequent in the wards of the Johns Hopkins Hospital than acute articular rheumatism and almost as common as tubercular arthritis.

Syphilis causes disfiguring lesions of the skin, loss of hair, disease of almost all parts of the body, and must be considered in the destructive ataxias, paralyses, nerve degenerations, bone necroses, insanity and imbecility. For the year 1906 venereal disease headed the list as a cause for rejection to the United States Navy, being 100.19 per 1,000.

When we come to consider the relation of venereal disease to married life and the woman, we realize even more the terrible effects. With married life it is almost inevitable that where one of the parties is infected the other becomes infected also. Fully eighty-five per cent of married women who contract gonorrhœa are infected innocently by their husbands. The gravity of gonococcal infection in woman is much more serious than in man owing to the anatomical differences. The infection is not confined to the urethra but extends. The disease at first is insidious; the latent gonococci which may have lost their virulence in the man are stirred into renewed activity by a menstrual period and ascend into the uterus, tubes, ovaries, and even the peritoneum. All this takes time and only when the woman is compelled by a condition of invalidism does she consult a physician, bears it in silence or treats herself with one of the numerous remedies so widely advertised to cure all female complaints.

S. T. Johnson says: "The effects of gonorrhœa in the female generative organs have been so destructive that no successful contradition is feared when the belief is expressed that no disease in modern times has caused so much indirect mortality, mutilations and suffering, both mental and physical, as gonorrhœa." Gynecologists estimate that from sixty to seventy-five per cent of their operations are made necessary through gonorrhœa. Morrow says that seventy per cent of all the women treated under his care at the New York hospital were respectable married women, who had been infected by their husbands. Hummeiston states that ninety per cent of his operations are due to gonorrhœa. Price states that ninety-five per cent of 1,000 abdominal operations were due to the same cause.

The influence of gonorrhœa as a factor in depopulation is seen when we consider the great number of pelvic operations necessary to restore health and save lives of these women. It is again seen as a cause of abortion; Sawyer claiming that as many abortions are due to gonorrhœa as to syphilis, and also in the "one child marriage" where infection of the tubes and ovaries results from the favorable condition found at childbirth with resulting sterility.

Fortunately gonorrhœa is not inherited, but as concerns the child we must consider ophthalmia caused by gonococcœal infection. F. Parke Lewis states that carefully tabulated statistics demonstrate that at least one-tenth of all the blindness is due to gonorrhœal ophthalmia.

Thus we see that the effects of gonorrhœa are definite and directly attributable to this disease alone. When we consider syphilis we find it more complex, and its effects difficult to ascertain. The local and systemic effects are the same in both sexes. The primary lesion, the various secondary symptoms, and the blood infection lasting for years, together with the many vague tertiary sequelæ. In the matter of heredity syphilis leaves the parent neither sterile or impotent, but the child it may kill or leave it liable to destruction from other agencies. The disease may be transmitted to the fetus and cause three results:

1. It may destroy it and cause its abortion.
2. It may kill it shortly before or after birth.
3. It may allow the child to be born alive but bearing evidence of the disease, which may develop at some later time.

We must also consider the danger to the child from parents infected shortly after its birth. Fournier's statistics show that the mortality from heredity syphilis in hospital practice is eighty-five per cent, that is, the children dying either before or shortly after birth.

We have thus briefly considered the prevalence and results of venereal disease. That it is on the increase rather than on the decrease there is no doubt, and until the public is taught the fact that it is serious, and what is necessary for a cure, it will continue so. The education of the public is not the province of this paper, but the writer cannot refrain from saying one thing:

That some steps should be taken by the Boards of Health to prevent the public advertising of quacks, who guarantee a swift and sure cure, and the prescribing and sale by druggists of medicines also guaranteed, — a law similar to that forbidding the sale of morphine and cocaine.

THE PRESIDENT. The next paper upon your program is by Dr. Post upon "What should be the attitude of Boards of Health toward Venereal Diseases." I have the pleasure of introducing to you Dr. Post.

WHAT SHOULD BE THE ATTITUDE OF BOARDS OF HEALTH TOWARD VENEREAL DISEASES

By DR. ABNER POST
Boston, Mass.

DR. POST. The attitude of the community towards venereal diseases is very largely one of apathy and indifference. Such indifference is chiefly due to an ill-defined idea that these diseases are the punishment set by the Almighty upon unchastity; that they attack only evil doers, and have no terrors for the chaste; that their control means a traffic in vice and its encouragement by making it safer. This ignorance and these erroneous ideas prevail very largely in our own profession.

The question proposed for discussion today should be limited a little. Instead of the question, "What attitude should Boards of Health take on venereal disease?" let us ask, "What is the present duty of Boards of Health towards venereal disease under existing circumstances in this community?"

It hardly seems necessary to plead for *some* action. For years we have cultivated these diseases. We send our soldiers and sailors to the Orient to bring them home. We import them with our immigrants. We invite immigrants from countries where syphilis is most abundant. We are put on the defensive when a supposed case of smallpox or leprosy turns out to be syphilis. Our almshouses are full of cases illustrating the evil effects of venereal diseases, but not a hospital exists to treat cases in their earlier stages, when they are most dangerous to the community.

The paper just read has shown how these diseases have flourished under this system of cultivation. Surely we must all agree that the time has come when it is the duty of our Boards of Health to do all in their power to stem this growing evil. There may not be the same unanimity in regard to the means to be used.

The first duty is to gain the coöperation of the public. Nothing which outrages public opinion can succeed in a democratic country. When public opinion demands anything it is easy to obtain the means. The public should be taught that it is necessary to protect the innocent. If these diseases attacked only the guilty they might be disregarded.

Something would be gained if these so-called venereal diseases could be regarded simply as contagious diseases, dangerous to the community, rather than as evidence of evil-doing on the part of their bearer. Their names should be included in lists of contagious diseases dangerous to the community of which Boards of Health may take cognizance.

I believe it would be best for us in New England to absolutely and definitely surrender the idea (for the present, certainly) of license and periodical examination of public women. This expression of belief is not intended to express any opinion, *pro or con*, as to the value of this method as employed in many foreign cities, but simply a belief that it is not adapted to New England.

The success of such a system is more than doubtful. It is regarded as illogical by many to hold one sex responsible.

The attempt to pass a resolution in its favor nearly disintegrated the International Congress at Brussels in 1898 for the consideration of venereal diseases.

Similar regulation when limited to garrison towns has proved impossible in England, where public opinion closely resembles our own.

It is contrary to the moral sense of the community. It would be sure in New England to arouse a storm of opposition which would make its execution impossible. A proposition to establish such a system in our community would unite in opposition all the descendants of the Puritans, the advocates of equal rights for women, and practically all the clergy. It would be regarded with lukewarmness by a large part of the medical profession and with absolute hostility by an active minority.

On the contrary, if it were definitely known that such regulation formed no part of the present scheme, it would be much easier to unite the public in a crusade not very different from that now waged against tuberculosis.

It is also necessary to interest and instruct the medical profession.

When one thinks of the number of medical men who are themselves inoculated with syphilis when operating upon cases which they considered something else, it is evident that there is need of education before we can be trustworthy guides of the people.

It is not the evident cases that are dangerous so much as the poorly marked and the obscure.

Education of the medical profession was one of the particular recommendations of the International Congress already mentioned.

If our Boards of Registration in Medicine could be induced to add to their examination for license to practise, a paper on contagious diseases, including gonorrhœa and syphilis, it would certainly stimulate their study and oblige medical schools to provide for their instruction.

But what has been said is only preliminary to what follows. The way to limit these diseases is to treat and, so far as may be, cure those afflicted with them, and that means the maintenance of proper hospital accommodation.

At present, individuals afflicted with syphilis and gonorrhœa who are unwilling to accept almshouse relief are obliged to continue their labors or starve, no matter how intimate their association with other people. Bakers, cooks, barbers, waiters, children's nurses, distributors of milk, barkeepers and prostitutes are all alike obliged to continue at work. If a cook is discharged from your employment because you discover that she is syphilitic she can only seek work in some other kitchen where her disease is not known and not provided against.

A very large proportion of these persons would willingly accept hospital care during their dangerous period if it were available.

It is necessary to change the attitude of the public and especially of hospital trustees, that they may recognize the necessity of providing hospital accommodation for gonorrhœa and syphilis with equal facility as for other diseases.

We should go further and communities should be obliged, as in Italy, to provide hospitals or wards for such cases, and these hospitals should be so administered as not only to care for the sick but to provide for the instruction of medical students and practitioners.

We are sadly in need of opportunities for instruction. As a profession we fail in our duty to the public. We do not recognize syphilis in its early stages nor gonorrhœa in its later. It is not our fault so much as our lack of proper instruction, and that fails very largely for want of clinical material which can be properly utilized.

If any one of the hospitals already incorporated but not erected would provide wards for syphilis and gonorrhœa, it would do more for the general health of the community than by the provision of twice the number of beds for general medical and surgical purposes.

Hospitals must be instituted preliminary to any other procedure. Repressive measures are out of place when no means are provided for hospital care.

But these hospital accommodations provided, it will then be in order to proceed against those who do not voluntarily avail themselves of the opportunities offered. It is not possible, nor is it necessary, to seclude every individual afflicted with these diseases, but there are certain individuals who from ignorance, carelessness or wilfulness are especially a menace to the community. There are others whose disease takes on so virulent a form that they are particularly dangerous to their environment.

Such persons are found occasionally at out-patient clinics, among applicants for charity and in the police court.

If Boards of Health were really in earnest in seeking out and secluding such cases, out-patient physicians, district visitors, charity bureaus and the police would render the same service in detecting and reporting them that they now exercise in cases of smallpox.

For these individuals other hospitals should be provided, apart from the voluntary hospitals already mentioned. They should be places where such patients may be guarded against escape; for these individuals are entirely apart from the more intelligent and careful class who would voluntarily seek relief. Into the first hospitals should be invited the unfortunate. In the second the depraved should be confined.

There stands upon the statute books (Chapter 75, Section 48) the following statute:

> An inmate of a public charitable institution or a prisoner in a penal institution who is afflicted with syphilis shall be forthwith placed under medical treatment and, if in the opinion of the attending physician, it is necessary, he shall be isolated until danger of contagion has passed or the physician determines that his isolation is unnecessary. If at the expiration of his sentence, he is afflicted with syphilis in its contagious or infectious symptoms, or, if in the opinion of the attending physician of the institution or of such physician as the authorities thereof may consult, his discharge would be dangerous to public health, he shall be placed under

> medical treatment and cared for in the institution where he has been confined until, in the opinion of the attending physician, such symptoms have disappeared and his discharge will not endanger the public health. The expense of his support, not exceeding three dollars and fifty cents a week, shall be paid by the place in which he has a settlement, after notice of the expiration of his sentence and of his condition to the overseers of the poor thereof, or if he is a State pauper, to the State Board of Charity.

This provision, as a part of a systematic attempt to limit the ravages of syphilis, would be a most valuable instrument. It would secure a certain number of the most reckless individuals, and the provision whereby the expense is charged to the towns where the detained syphilitic has a settlement would serve to emphasize the necessity of hospitals in such towns.

If our cities and towns were isolated, these measures would meet with a very considerable degree of success, but unfortunately we import a large amount of disease and it would become the duty of the inspectors of immigrants to use all possible care that the obvious cases at least are detained.

Were the movement against venereal disease at all general, the surgeons of the army, navy and marine hospital corps would be found to be most valuable coadjutors in the work.

A few years of such effort would accomplish a great change in the prevalence of these diseases. With the increase in our knowledge of their bacteria, we have reason to hope that some serum or vaccine, not yet possible, will aid repressive measures. But then, as now in venereal as in other contagious diseases, eternal vigilance will be the price of safety.

THE PRESIDENT. The Association is fortunate in having two other guests who can speak to us instructively and authoritatively upon this important subject. I am going to ask your attention to Dr. Malcolm Storer of Boston.

DR. STORER. Dr. Durgin has asked me, at very short notice, to contribute what little I can to this discussion, not because I have in any way been identified with the campaign against Venereal Disease, but because, I suppose, he knows that I take great interest in the crusade, and have had opportunities of seeing a large amount of disease in women, especially gonorrhœa, in spite of the fact that I have rather discouraged such cases from attending my clinics, feeling that their presence was more or less of an active danger to the other more strictly gynecological cases. With a little encouragment the average gynecological clinic would become almost a purely venereal one. I remember, however, two cases at my clinics that were undoubtedly infected by dirty hands or instruments, in spite of the ordinary care, and for that reason I do not welcome venereal cases and should be glad to see at our various Out-Patient Departments rooms devoted exclusively to venereal disease to which the greater part of such cases could be referred.

Leaving aside the mooted question of the possibility of ever really curing gonorrhœa in the female, fifteen years' experience in out-patient clinics has convinced me of what little hope there is of curing the disease in prostitutes under our present system, owing to their intermittent attendance and lack of thoroughness in carrying out directions. It is the very great exception that I can follow a case in a prostitute until I can tell her that she is apparently cured. Generally when the urethritis has subsided and the vaginal discharge has become inconspicuous the case disappears from observation, and I suppose most of the girls are engaged in actively spreading the disease as soon as coitus is no longer painful, in spite of the clear explanation of the probable consequences to their victims that is generally given them, and it seems to me that in default of better methods of treating these cases this state of affairs must of necessity continue. I cannot but feel that reform must be brought about along the lines of education and more strict supervision of houses of ill-fame. More education is needed in the whole subject of sexual hygiene and especially should it be emphasized what a grave matter sexual diseases are apt to be when improperly or half-heartedly treated. The average boy is now having his eyes opened to a certain extent to the probable consequences of sexual transgression, thanks to a better appreciation on the part of parents of the great wisdom of explaining such things to him. I could, however, wish that the system of having talks on sexual hygiene in our upper schools could be much more widely extended. The great trouble is that the girls, as a rule, get no instruction other than that which they may pick up from their more sophisticated sisters, and then knowledge generally comes only after the damage is done. I believe that at present there are no talks on sexual hygiene given our public school girls and probably a proposition that there should be would be met with much hysterical clamor at the wickedness of putting such ideas into girls' heads. I feel, however, that if the step were once taken its wisdom would not be questioned after a very short time. The few parents who might object to their daughters knowing that they have insides could simply keep them away from the one or two lectures needed. A plain, simple, commonsense talk, taking these matters out from the mystery in which parents are generally content to let them rest, would, I think, plant seed in the mind of many a girl that would not be forgotten at the time of temptation. Experience has shown that morality alone will not always keep girls straight — might it not be worth while to try what a little knowledge might accomplish? Sentimental objections about putting such ideas into girls' heads have not as much weight as say fifty years ago. Most girls of fifteen or sixteen nowadays think they know quite as much as their mothers, — had not that wisdom better be imparted to them by some competent person rather than be picked up haphazard? The idea of personal cleanliness appeals to most girls of whatever station, and very few of them, until they have found out by bitter experience, have any idea of the loathsome nature of some of the forms of sexual disease — in fact, hardly appreciate that there is anything to be feared except maternity.

Much could be done along the line of the education of already infected patients by the distribution to suitable cases, as they present themselves at our clinics, of leaflets describing the dangers of gonorrhœa, and the necessity of as thorough a cure as possible, something after the manner of Dr. Follen Cabot in New York, and especially insisting on the importance of all men who have had gonorrhœa presenting themselves for examination before they get married, no matter how thoroughly they think they have been cured. An analysis of the last 340 cases of gonorrhœa in women presenting themselves at the Boston Dispensary, has some bearing upon this point. I have chosen the Dispensary rather than the Carney or St. Elizabeth's hospitals, as prostitutes rather shun the neighborhood of the Sisters of Charity, and either of those hospitals would show a disproportionately large number of married women. I have excluded the large number of cases occurring in children under twelve as practically all of them are innocent. Of these 340 cases, 130 were single, and 210 probably married. Of the 140 single cases only fourteen were over thirty, sixty-two per cent of them being between seventeen and twenty-two. In the married women the range of age is much greater, increasing regularly from eighteen to twenty-eight, remaining about stationary till thirty-four, and then decreasing gradually, but in spite of this nearly a quarter were over 40 and several over 60, the oldest being sixty-eight. Of course it is impossible to say with any accuracy how long the disease had been going on when first seen in these cases, certainly for many years in many. I remember one woman of twenty-seven who had had an evident gonorrhœa since she was three years old, frequently confirmed by the microscope in recent years, but the striking fact in these 210 married women is that sixty-eight had evidently been infected by their husbands soon after marriage. Of course some of the older women might possibly have acquired the disease from other sources, but the constant story in these young married women, in the cases where the wife suspects the trouble, is that the husband had a discharge some years previously but thought that he had been cured, and in most cases, I think, honestly.

I have said that such leaflets might be well distributed in suitable cases, for I cannot but feel that a vast amount of harm would be done if they were scattered broadcast to married and single, as some enthusiasts would do. It would be brutal as well as useless to tell many married women that they have gonorrhœa. I have seen many a married woman through an attack of gonorrhœa without her ever suspecting that her trouble had been given her by her husband, where his disease probably antedated his marriage by years, but where nothing would have convinced the woman that her husband had not been unfaithful had she been told that she had gonorrhœa, to say nothing of her useless grief at being inflicted with a disease that most women regard as disgusting. Of course in these cases I try to get the husband under treatment as well as the wife. I was rather struck with the large proportion of married women in these dispensary cases, although I rather strained things and entered as single a number of girls who said they were married, but whom I felt would have had great difficulty in producing the alleged husband.

Such leaflets would undoubtedly do much good in suitable cases, but I must say that I rather despair of very much being accomplished by education, unless it be the education of our public to the recognition of the fact that no matter how much they shut their eyes we have the Social Evil with us, and always will have it, and that properly and strictly supervised open houses, objectionable as they are from many points of view, are a vastly lesser evil to the community than the prevalent methods of allowing such places to exist only as breakers of the law, with the health of their inmates dependent wholly on the caprice of the mistress. In advocating this, I recognize that in some instances the system of licensing houses has been a dismal failure. I wonder how often this has been owing to faults in administration. I recognize too, the argument that a brothel that is known to be practically safe may attract men upon whom fear might otherwise possibly be a deterring influence, but surely no one would regret the frequenting of public houses by many unmarried men if the possibility of frequenting such houses in comparative safety should in any degree lessen the temptation to seduce an innocent girl. Nor do I attach very much weight to the argument that New England prudery cannot be brought to recognize the existence of such things in our civilization. Interest in these matters and a more proper appreciation of their importance has been increasing vastly in the last ten years, and I have great hopes for the future. I do not feel very much drawn to the scheme that has been proposed of reporting all venereal cases to some central bureau and having them followed up by a social worker. I think that a very short experience of this would drive the girls even more than now to quacks, for there they would at least find secrecy. Much as I dislike extending the sphere of paternal government I fear that the whole question of the Social Evil will never be properly handled while attempts to control it are in private hands. Its management seems to me entirely within the province of our Boards of Health, and for myself I feel convinced that control will be most effective when prostitutes are segregated as much as possible, in houses that are licensed and frequently inspected, and where it shall be understood that the license shall be promptly revoked and the mistress and owner severely punished as soon as it is proved that a single inmate has been practising her profession without a clean bill of health. I recognize the difficulties of inaugurating such a scheme here as well as those of carrying it out in the proper way. It is not to be expected that it will be all clear sailing from the start and that no mistakes in conception and personnel shall be made — for instance, even after our city fathers have made up their minds to brave the wrath of their wives and authorize such a system, it would be no easy task to obtain the right men for inspectors, for they must be competent and entirely trustworthy machines, yet I am confident that it is along these lines, if any, that progress will be made. With such a system there would surely be much less clandestine prostitution, which I think most authorities regard as much more dangerous to the community than open houses whose success is to a certain extent dependent upon their reputation for safety.

THE CHAIRMAN. The Association will be glad to hear from Dr. Carson.

DR. CARSON. In 1891 the General Court of Massachusetts enacted a law that was intended to stop, as far as possible, the spread of syphilis by a class of people who, by their habits and manner of living, would be particularly likely to spread it. While the law seems plain enough, there seems to be a wide difference of opinion in interpreting it. One opinion, rendered by one of the most eminent legal officers in the State, was to the effect that all cases of syphilis in penal and public charitable institutions came under the jurisdiction of the Boards of Health of the city or town in which the institution was located, and that all cases should be discharged as soon as the outward manifestations of the disease had disappeared. Another opinion was the same except that it placed the responsibility of discharge on the physician in charge rather than the Health Board. Still another declared that neither the Health Board, physician in charge or anyone else had any right to detain a syphilitic against his will. The opinion rendered by the law department of the city of Boston, states that the syphilitic patient shall be detained under treatment until such time as the physician in charge shall decide that the patient is not in a condition to communicate the disease. It is obvious that adherence to any of the first three opinions would manifestly defeat the object for which the law was enacted, and the only difficulty in following out the latter opinion would be to decide when was the patient in condition not likely to communicate the disease. That, of course, is a question that cannot be determined with any degree of certainty. The rule now in operation at the Deer Island Hospital is to detain in the hospital under treatment all cases of early syphilis until they have had a full year's treatment following the appearance of the secondaries, and have had no outward manifestation of the disease for a period of at least three months. This, of course, is not a perfect protection to the community from these cases, who by their habits and character are particularly a menace, but it does undoubtedly prevent a large number of cases, and when we consider that a fairly large percentage of this class of syphilitics later in life develop general paralysis and various diseases of the nervous and circulatory systems and drift into insane asylums and almshouses, it must be seen that considerable expense, both to the city and State, is thereby saved. During the past three years twenty-one syphilitics under sentence in the Deer Island Hospital have been detained under treatment after their sentence has expired, for periods varying from ten days to eight months. In establishing the rule that we have, that is, to discharge no patient who has not been under treatment for at least one year after the appearance of the secondaries and three months after the disappearance of all symptoms, we feel that we have been doing the least that should be done.

What interpretation other institutions make of the law I do not know, but I do know that at the present time I have in the woman's ward two cases of syphilis that have been treated in other public institutions that come under the same law that applies to the House of Correction. Of these one was released after two months' treatment on her promise to mend her ways and take treatment outside, and the other was released without any reservation whatever after five months' treatment. Both are under sentence for night-walking and the chances are that they have sown the seed for a fairly good-sized crop of syphilitics. I have known of several similar cases, one in particular that of a girl who was treated in a public charitable institution for five months and then released to go to a small New Hampshire city where she succeeded in infecting at least six members of the community; how many more I do not know. What I think should be done, is to have a stated period of time, say at least a year, preferably eighteen months, inserted in the law rather than have it as it now stands, or else a definite opinion rendered that would be observed by all institutions.

THE PRESIDENT. The tremendous importance of this most serious of all the contagious diseases has been set before you, gentlemen. What have you got to say to it?

DR. H. L. CHASE. Mr. President, I have not had as much experience in the treatment of venereal disease as some of the other members of the Association, but the great importance of this question has been impressed on me ever since I entered college. Of course, there are certain times in men's lives when they see a great deal of this disease and certain other times when they see very little of it. I suppose some of us who live in the suburban districts or in the country, especially those who are not physicians, see very little of it, perhaps never hear of a particular case from one year's end to another where we live. All of us, however, who have lived in cities, all of us who have been in college or in any large manufacturing place, or in the army, have seen a great deal of this terrible curse of gonorrhœa and syphilis, and those of us who are in general practice, as I am, often see the effects of gonorrhœa in our female patients, in such cases as Dr. Storer has just referred to. It seems to me that the principal speakers here today agree perfectly, that while better facilities for treatment are needed, prevention is of most importance and is mainly a matter of education. The lack of proper education, and of both sexes, allows young people to blunder into this terrible thing unwittingly, and then they have got to have recourse to medical aid, which it is very hard to get; there are ever so many obstacles in the way of getting adequate treatment. Even if we establish the hospitals that Dr. Post has so wisely recommended, they will not go to the root of the trouble. Several years ago I went every day, for some time, to the "lock-hospital" in Prague, with Professor Pick, who had charge of the unfortunate patients there, and saw those poor girls locked up in there, for isolation and treatment. I remember well one poor girl, who I am sure was not more than twelve years old, who had serious gonorrhœal trouble; her case was something most pitiful. In spite of such provision, the supply of patients continued a constant one in Prague and elsewhere. If we have those hospitals here they will do a great deal of good, in a certain way, but in order to accomplish the best results we have got to go further back. We have got to take up the other measure which all agree is so essential, namely moral and hygienic instruction as to sexual functions. It cannot begin too early, it seems to me. Of course we must not give the whole truth to little children or even to older children, but there is a common-sense way to answer the questions our children ask us about the baby, and there is also a wrong way. As they get older and ask more questions, they ask what their sexual organs are for, and there is a tactful and commonsense way to enlighten them. It is now beginning to be recognized, almost everywhere, that it is a proper and necessary subject for hygienic instruction.

When I was in college, Prof. William James gave a course of lectures on hygiene, and one lecture was devoted to hygiene of the sexual organs. That was the most interesting and important lecture he gave. The lecture-room was crowded to the doors, and he had to repeat it the next week in a much larger hall, and that was filled too. The medical visitor at Harvard now gives an excellent course of lectures every year on personal hygiene, including that of the sexual organs, and the students appreciate it.

I think it would be a great pity if we should go away from this meeting without taking some practical step in the work that this Society may be expected to do. Sometimes we appoint a small committee to investigate and later to recommend what steps, if any, this Association should take toward bringing about a much-needed reform. If it is in order, I move that a committee be appointed by the President to take up this matter and report to the Association at a subsequent meeting.

(This motion was duly seconded and passed.)

THE CHAIRMAN. This does not, however, I hope, close the discussion.

DR. DORMAN. Mr. President, I would like to ask for a little enlightenment on one point. I have been very much interested about gonorrhœa occurring in young children, especially in institutions. If that infection in that form is serious, it is certain that the managers of those institutions have a very great problem before them, and I would like to know whether gonorrhœa when it occurs in young children is likely to have bad consequences, or whether they speedily recover from it. Do the girls, for instance, remain infected for a long period of time, or are they apt to? Do the boys remain infected? Are permanent organic changes in the urethra and genital organs of the female likely to result from this infection which I understand is rather sub-acute, which is so frequent in young children in institutions?

DR. STORER. I will, perhaps, let Dr. Wilson speak for the boys, I see none of those. In young girls it is a very, very obstinate infection. Some men claim that untreated it does as well as when treated, anyway it generally lasts at least a year. I can remember of several cases lasting two years, and in a certain number of cases trouble with the Fallopian tubes has resulted. I had a private case last summer of very distinct irritation of the tubes which, although now dormant, will in all probability give the girl trouble when she arrives at puberty that her physician will not be able to explain. A German surgeon has reported four or five cases of operation for pyosalpinx in children under five. A case of gonorrhœal vulvo-vaginitis is a very great danger to other children. I did not know of the epidemic in a Boston institution Dr. Wilson spoke of, but besides that epidemic in Posen that he spoke of a large number of small epidemics have been reported occurring in foundling asylums, undoubtedly due to dirty water and towels. I cannot remember more than one case in a small child in which the disease was due to placing the sexual organ against the child's genitals. A few cases have been due to handling the genitals with infected hands, but most of them were due to sleeping with an elder sister who had gonorrhœa, or using infected towels or sponges.

DR. WILSON. I think it is just as serious in the boys as in the girls. It is surprising how common it is among children, particularly in hospitals. In the Children's Hospital here in Boston I can remember, some years ago, twelve cases inside of six months in the wards, some of those coming on after admission so far as we knew, others must have been there before they came in. We had a very hard time stamping it out and finally had to insist upon a strict examination of every child applying for admission, and not admitting a child until the examination was proved negative. If I am not mistaken, that is still kept up. It was only last week that I saw a little boy about eight years old who contracted gonorrhœa somehow or other, undoubtedly innocently, four years ago. You can still find gonococci, and how much longer those bacteria are going to stay there I cannot say. What the final effect of infection in children is, we do not know. These bacteria have a way of getting into the seminal vesicles. Whether they prevent them from growing properly or not is a question, but there is no doubt that it is very serious. As far as institutions go it is exceedingly serious, because you will not only get your trouble in the wards, but you have also to satisfy the parents that the child who goes home with the discharge did not get it in the hospital.

DR. SWARTS. Mr. President, if as it has been stated to you this afternoon by the first speaker, and reiterated by the others, and as it has been reiterated in the medical literature for the past five or six years, there is so much blindness, so much suffering, so much mental depreciation, so many laporotomies in the female hospitals, to the extent of 40 or 50 per cent, — or as Dr. Valentine puts it, of all the cases of laporotomies in the hospitals, 60 or 70 per cent are due to the presence of gonococci in the Fallopian tubes, — if syphilis requires the maintenance in our various institutions of many chronic incurables, adding to the expense of the State, it surely is within the province of the Boards of Health, which I presume are intended to conserve the public health, to take cognizance of them, to make an effort to suppress them. They are communicable and therefore preventable. That such an effort is being made has been shown already in the action of various societies of this kind. I might recall to your minds the fact that when the American Medical Association met in this city a few years ago, as Chairman of the section on Hygiene and Sanitation, I devoted a whole day to a symposium upon this very subject. Two years after that another symposium was held. Last year, at Atlantic City, the same subject was taken up again. At the conference of State and Provincial Boards of Health, which represents the executive officers of State Boards, some four years ago the same subject was taken up, and they agreed to take the matter up in a practical manner, such as has been suggested to you today, that practical manner being in the form of offering to supply to all State Boards of Health a circular which should be agreed upon as being a proper form, and which would indicate to a patient and to the physician the severity and dangers of these diseases. As I remember, I had orders for something like 80,000 of these circulars to be distributed, and we distributed them in some four or five different States. Among those States was Rhode Island, which I represent. The method was to supply each physician with a number of circulars, stating upon them the conditions which were liable to accrue under these different diseases.

(This circular was prepared by Dr. Henry S. Holton, Secretary of the State Board of Vermont, and appeals directly to the patient.)

Circular of Information

Adopted by the Conference of State and Provincial Boards of Health

Issued by the State Board of Health
of Rhode Island

We hand you this leaflet believing that you would not willingly communicate your disease to some innocent person.

Many fail to comprehend the exceedingly disastrous results that often follow these diseases. Many cases of blindness, complete disability, and not infrequently death results from them. Gonorrhœa is one of the most frequent causes of diseases peculiar to women. So serious a menace have these diseases become to the public health that the medical profession and sanitarians in all countries have become alarmed, and are advocating measures for their prevention.

Syphilis (or Pox) is especially a disease from which innocent persons may suffer, as it usually produces sores in the mouth or on the lips, hence may be conveyed by kissing, drinking from the same cup, or using anything which has been put to the lips or into the mouth of one affected by the disease.

These diseases are often communicated when the patient thinks he has recovered. Hence marriage contracted at this time of the disease results in much unhappiness, and often in the death of the wife. To protect yourself and others, we earnestly advise the following:

IN THE INTEREST OF PREVENTION OF YOUR DISEASE.

What to do and what not to do, to get well and to prevent giving your disease to any other person.

Follow strictly the advice of your doctor, use no other treatment.

Remember that it takes a long time to entirely recover.

> Carefully wash your hands with soap and hot water whenever you handle the private parts.
>
> Do not have intercourse and avoid all sexual excitement until your physician says you are completely cured. Be especially careful not to rub your eyes with your fingers.
>
> Do not allow any person to use any cup, glass, spoon, fork, or anything that you have put in your mouth.
>
> Do not kiss anyone or wipe the face of a child with a handkerchief you have used. Always use a separate towel. Burn all cloths or cotton soiled by discharges.

The question arises, what is the advantage of such a circular? It is this: after you have had a patient in your office, and after listening to your statement that he has a disease which to his mind is one of the most serious on earth, perhaps even to the extent of causing the patient to commit suicide for fear of the results of this disease, when he receives the admonition for precaution it all goes in one ear and out of the other, and in a state of alarm he goes out of the office, forgetting entirely the precautions which the physician has impressed upon him. If a circular of this kind is placed in the patient's hands he places it in his pocket unwittingly, and when he reaches home he may read it over once or twice and become impressed with the necessity of care. By the repetition of that condition by the physician from time to time to the same patient, much can be done in the care and prevention of the disease in that individual and his family. I might state also that the American Public Health Association has taken this subject up in the same way, and has advocated the dispensing of circulars in this way. Some of the members have even gone so far as to request that school teachers should be instructed in detail as to the conditions of these diseases. It is entirely a matter of education, and that education must come from the Boards of Health. You cannot get the physicians to undertake it, they don't know how to go at it. In fact, none of us if he were not a health physician would attempt to give a lecture upon a subject which is tabooed by the public. The people must be educated at the beginning. Clergymen are of no assistance to us. The education which comes to the medical student in college in his third or fourth year, when the professors are giving the subject importance, has little value, inasmuch as the student has unfortunately learned from practical experience in his freshman year much more than the instructor can teach him.

It seems to me that the subject should be taken up in the kindergarten — a rather rash statement, but it can be done by the teachings that we have in the kindergarten at the present time, starting on biological lines of instruction, leading up in the upper grades as they advance to more interest in the details of this subject. This question should be brought before the older classes in such a way as to create no disturbance, no comment, no suggestion of disagreeable thoughts or ideas, and I think to serve the purpose to that end some one of us has got to make a movement in the beginning. Everyone of us shirks from making that, for fear of being accused of seeking notoriety, but it seems to me that the State Boards of Health can approach the subject with propriety. They should issue monthly bulletins and continually stimulate each other by meetings. I know this subject is one of delicacy, or has been thought to be so. But the sooner we begin to make use of the words, "syphilis" and "gonorrhœa," instead of the words "venereal disease," the better, remembering that many of these cases are gonorrhœa without knowledge of the presence of the disease, brought on innocently, and without venereal contact. Only the other day a man came in from a barber shop with a typical primary sore on his lip. He said the barber shaved him and touched him with a stick of alum two weeks ago. It is a practice in our skin clinic to give one of these circulars to every patient who presents primary lesions, and when the mucous membrane of the mouth is diseased, in order to impress the patient with these precautions. The State of Indiana has gone so far as to say that this disease is one which should receive legal control, inasmuch as their little precautionary card which they send out says that it is illegal to marry in Indiana if you have gonorrhœa or syphilis. I think if positive action could be brought about, quietly, not with ostentation, that much good could be accomplished by education by Boards of Health, if they were willing to take hold of it and would follow it up in a thorough manner.

DR. PALMER. I do not think any more important subject can be taken up by our Society than the one which we have today. The importance of it I do not think can be overstated. I want to state simply one feature which has come up in several ways here today, and to give my personal experience, querying in my own mind whether it is an average of what may be the sentiment in other portions of the State — that is, of public education. I have the feeling, Mr. Chairman, that the public is a good deal more willing to be taught on this subject than we give them credit for. I state that fact from my personal experience. In my section I have been invited before our local Woman's Club at three different times to talk on this question, and I was surprised at the fact because I got that rare compliment of being called into the same place three times in one season, which is a pretty good test of public interest. Of course, every time I called a hoe a hoe, and a spade a spade, and yet they were ready to listen. From that I have been called into another city's club and talked on the same subject, and there too I had ready listeners, and they realized the importance of it. I have for several years — I do not remember how many — gone to one of the leading public preparatory schools of New England, and given a very plain, straight-to-the-point talk to the boys of that school on this subject, and although when I first begin to talk they have their side-glances, yet in a very few minutes it is the most attentive and interested audience that I have ever spoken to. I think such instruction is very much needed.

Gentlemen, we do not begin to realize the menace, mischief, danger and fatality that is due to this one neglected, tabooed, mystified subject, and which should be the most well-known, and I think it is entirely within our province to take the lead on this, and if this representative body will take the lead, I am very sure that many of the local Boards of Health throughout the State would be only too glad to follow. I think we can do much practical good by the discussion that we are having today, and perhaps from it we can have a future investigation and some legal restriction.

We cannot do here as I saw a professor do in Vienna, when he had a girl upon the table, young, pretty, and presumably innocent before that time. He questioned her until he learned who communicated the disease to her, and then in that despotic city he sent out a police officer, got the man who infected her, and brought him in and confined him in the hospital until he was cured. Would to God that we had some such power in democratic America.

DR. SHEA. Mr. President, that power has been used by the Boston Board of Health on several occasions. Often a case is brought to our attention by a keeper of a house. The girl has reached that stage where her money is gone, and she is to be put on the street. These cases are not brought to our attention very often, but they come occasionally. We visit these cases, and after investigation endeavor to find beds for these people, that they may be cared for. We are ready to remove those cases that are a danger to the community, not only tuberculosis, but also syphilis and gonorrhœa.

As I have said, some cases we have removed, and have removed them by force. Tomorrow, for example, a case is brought to our attention. A girl is in one of these houses. We make investigation and find that she is a danger to the community. The first step is to report this case and have her settlement looked up. The great majority of these cases have no legal residence in Boston. Cases are referred to the authorities for admission to the Long Island Hospital. That is the only hospital in Boston that will receive a case of syphilis. If that individual, man or woman, has no legal settlement in Boston, the case is refused, and the only place we can send the patient is to the State hospital at Tewksbury.

Again, sometimes we meet with the objection that it is illegal to remove that individual by force outside of the city of Boston, but we have taken the chance and sometimes sent these patients as far as the train and placed them in charge of the proper officer, and they have been sent to the State hospital. A great deal of this work could be accomplished here in Boston if we had the beds, but while conditions remain as they are, much cannot be accomplished. I think myself that this evil can be fought on the same lines probably as tuberculosis. The first and only requisite is, hospital accommodations; next a dispensary. The hospital should report these cases, and we will be able after investigation to pick up a great many of the cases. We could do a great work by taking these people and housing them in hospitals until we are sure they are free from danger. As I said, we have made a beginning, and we are only too willing to do more of this class of work if we had the necessary hospital facilities.

A dispensary modeled on the line of the dispensary that has been recently established by the Trustees of the Consumptive Hospital would be of immense benefit in selecting suitable cases for hospital treatment.

DR. R. E. STEVENS. Mr. Chairman, there is one little subject in relation to this talk that I had some personal experience in. Before I studied medicine I was a druggist, and it would be surprising to the medical profession if they knew the number of these people that go to the druggist. I do not believe there is hardly a drug store but what has the old Lafayette mixture, which I remember was dispensed. I can remember an inland city, a manufacturing city, where there is a great deal of gonorrhœa and syphilis, and it is increasing. There is a hospital officer in this city who said it always seemed a sad thing that a girl or young man could not get into the wards. If we have hard work in looking after our additional cases, for a certain class of doctors do not take any care as to restricting the family — a doctor leaves the house and everybody mixes with the family, — how can we expect that these people or this kind of doctors are going to report these cases of gonorrhœa and syphilis to the authorities? Not to go over what has been so nicely said, it has got to come through education. I find young ladies do not know anything about it. A man comes in with syphilis and he has had several connections since he got his primary lesion. I believe it has got to come through education. I wanted to speak about the drug store. If there was some way the State Board of Health could keep the druggists from prescribing over the counter, I think it would be one good step.

THE CHAIRMAN. Is there anything else to be said upon this subject? If not, I declare the discussion closed. We will now go back to the formal business of this meeting. The first item of business will be the reading of the records of the last meeting.

Upon motion of Mr. Rickards, duly seconded, the reading of the records was dispensed with.

THE PRESIDENT. The Executive Committee reports to you for election to this Association the following list of names:

Frank H. Kennedy of Brockton.
Dr. Charles E. Simpson of Lowell.
Dr. E. J. Cotter of Shawmut Ave., Boston.
Dr. Francis J. Keany of Boston.
Dr. Wallace C. Keith of Brockton.
Dr. Charles E. Morse of Wareham.
Dr. Adam S. MacKnight of Fall River.
Dr. Harry Linenthal of Roxbury.
Dr. J. William Voss of Beverlv.
Dr. William Hall Coon of Lawrence.
Dr. William W. Walcott of Natick.
Dr. Melvin G. Overlock of Worcester.
Dr. Louis Fish of Fitchburg.
Dr. Harvey T. Shores of Northampton.
Dr. Lyman Asa Jones of North Adams.
Erastus H. Smith of Concord.

By a unanimous vote these gentlemen were elected members of the Association.

THE PRESIDENT. The next business upon your programme is the election of officers for the ensuing year.

Upon motion, duly seconded, it was moved that a committee of three be appointed by the Chair to select the officers.

THE PRESIDENT. I will appoint as members on that committee Dr. Worcester, Dr. Newcomb and Mr. Rickards. Gentlemen, this seems to be a favorable point to hear the report of the Treasurer. If there is no objection, the Treasurer will now make his report.

THE TREASURER. The report for 1907 reads as follows:

RECEIPTS

Balance from 1906	$1,515.81
Interest	47.51
Annual assessments for 1907	468.00
Annual assessments for 1906	30.50
Total	$2,061.82

EXPENSES

Postage	$43.10
Printing	47.80
Cigars and dinners for guests	29.50
Clerical assistance	9.25
Treasurer's bond	4.00
Report of meetings	85.20
Printing Journal, 5 numbers	281.26
Use of stereopticon	10.00
Travelling expenses of speaker	20.00
Total	$530.11
Balance to 1908	$1,531.71
Total	$2,061.82

Of this balance $1,262.51 draws interest in the Central Savings Bank, Lowell.

Respectfully submitted,

JAMES B. FIELD,

Treasurer.

Examined and approved as correctly cast and properly vouched for.

J. ARTHUR GAGE,

Auditor.

January 27, 1908.

By unanimous vote the Treasurer's report was adopted.

The Executive Committee reported the following nominations:

For President, H. P. Walcott, M.D., of Cambridge.
For Vice-President (First), S. H. Durgin, M.D., of Boston.
For Vice-President (Second), C. V. Chapin, M.D., of Providence, R.I.
For Secretary, James C. Coffey of Worcester.
For Treasurer, James B. Field, M.D., of Lowell.
For Executive Committee (for two years), Frank G. Wheatley, M.D., of North Abington; G. Arthur Bodwell of Salem; L. M. Palmer, M.D., of South Framingham; a majority report of two for Dr. John F. Worcester of Dorchester; Dr. J. J. Goodwin of Clinton; George W. Smith of Lawrence to fill an unexpired term of one year.

THE PRESIDENT. Gentlemen, you have heard the report of your committee. What action do you take thereon?

Upon motion, duly seconded, it was voted that the Secretary be authorized to cast a ballot electing these officers for the ensuing year.

THE PRESIDENT. The Secretary reports that he has deposited the vote and that the ticket as reported is elected. Is there any business to come before the Association at this time?

MR. RICKARDS. Mr. President, does the motion made at the last meeting in regard to the change of name of the Association come up before this meeting?

THE PRESIDENT. Unfortunately, by some misunderstanding, the Constitution is not being carried out. The notice of the amendment was not printed upon the notice of this meeting as it ought to have been. It will appear, however, upon the notice of the next meeting.

THE SECRETARY. Mr. President, I will read the clause in the Constitution relating to amendments. It says: "Changes in the Constitution and By-Laws may be made at any regular meeting, written notice of the same having been given at the previous meeting, by vote of two-thirds of the members present." In order that this amendment may be brought up at the next meeting, written notice must be given at this meeting, and no written notice has been given as yet. The notice at the last meeting I think was a verbal one.

THE CHAIRMAN. The following notice of a proposed change in the Constitution has been presented: that the name, "Massachusetts Association of Boards of Health" be changed to the "Massachusetts Public Health Association."

DR. WORCESTER. I move that this matter be referred to the next meeting, in accordance with the Constitution and By-Laws.

This motion was duly seconded and passed unanimously.

THE CHAIRMAN. Before the members go I will announce the committee to act on Dr. Chase's motion. This committee consists of Dr. Palmer of Framingham, Dr. Chase of Brookline, and Dr. Swarts, Secretary of the Rhode Island Board of Health.

On motion, duly seconded, it was voted to adjourn.

BIOLOGICAL LABORATORY NOTES

By **FREDERIC P. GORHAM,**

Associate Professor of Biology, Brown University, and Bacteriologist,
Providence Health Department

SOME CONVENIENT LABORATORY DEVICES. Drs. John S. Fulton and Wm. Royal Stokes report * certain time-saving devices from the Bacteriological Laboratories of the State and City Boards of Health, Baltimore, Maryland. A dust-proof sterilizing and storage box for petri dishes, a cage for incubating plates, a tray for fermentation tubes, an express package for shipping ten samples of water for bacteriological examination, a portable charcoal oven for making plate cultures at the well side, an extensible box for carrying inoculated plates in the field, slanting baskets for fluid culture media, an improved waterbath and a dust-proof sterilizer for 50 pipettes.

ANÆROBIC CULTURES WITHOUT EXCLUDING AIR. L. Girardi found † that anærobic bacteria would grow nicely in bouillon without the exclusion of air, if extracts from fresh internal organs, especially the liver, were added to the medium. The organic extracts absorb a considerable amount of the oxygen and, though the growth is slightly retarded at first, it soon establishes itself and the presence of the air no longer interferes with the development of the bacteria.

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* Centralbl. f. Bakt., etc., I, Orig. XLIV, 1907, 89.

† La Reforma Medica, Sept. 21, 1907.

BACTERICIDAL ACTION OF SUNLIGHT. Dr. John Weinzirl reports * certain experiments to show the action of sunlight upon bacteria. He concludes that "the methods heretofore employed in testing the bactericidal action of sunlight do not seem to be well suited for this determination, since the results do not indicate the full power of this agent. The light is absorbed by the medium in which the bacteria are planted, and the glass cover both absorbs and reflects a considerable portion of the effective rays. A more suitable method consists in planting the bacteria upon glass or paper and exposing directly, *i.e.*, without glass or other cover, to the sun's rays. By this method most of the non-spore-bearing bacteria, including *B. tuberculosis*, *B. diphtheriæ*, *B. typhosus*, *S. choleræ asiaticæ*, *B. coli*, *B. prodigiosus*, and others, are killed in a remarkably short period of time, varying from two to ten minutes. So far as *B. tuberculosis* is concerned, it is the more refrangible rays, or the violet end of the spectrum, which are bactericidal for this organism."

A NEW STAINING METHOD. Dr. Henry G. Piffard states † that "it is well known that it is extremely difficult to stain living bacteria in a satisfactory manner, and if, on the other hand, they are killed by heat, they are in a measure shriveled up and details of structure, if they possess any, are invisible or at least obscure." To overcome this difficulty he recommends the use of what he calls a cyanide blue solution, as follows:

Distilled Water	100.0
Potassium cyanide, pure	1.0
Potassium carbonate, dry, C.P.	0.5
Rectified methylene blue	0.5

This mixture deteriorates on standing after a few days, and it is better to dissolve the potassium cyanide in one-half the water, and the other ingredients in the other half, and mix as needed.

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* Jour. Inf. Dis. 1907, Sup. No. 3, 128–153.

† N.Y. Med. Jour. LXXXVI, 1907, 965.

A small drop of the stain is placed on the center of the slide. To this is added a loopful of the desired bacterial or other culture, mixing it gently with the stain and preserving the drop form as much as possible. At the end of a minute a clean coverglass is applied, pressed down and the excess mixture absorbed with filter paper. It is now ready for immediate examination. The details of structure are much better preserved than by the usual methods.

This stain is applicable to the direct examination of milk as it does not stain the fat and the bacteria stand out in relief.

THE OPHTHALMO-REACTION OF TUBERCULIN. A very important contribution to the methods of diagnosis in tuberculosis has been made during the past year. It is an outgrowth of the method of obtaining a cutaneous reaction to an injection of tuberculin, first described by Pirquet of Vienna.* Wolff-Eisner in discussing a later paper by Pirquet on the above subject before the Berlin Medical Society,† suggested dropping a 1:10 dilution of tuberculin into the eye and noting the resulting inflammation. Calmette reported ‡ the first definite study of the reaction. He places upon the conjunctiva a drop of a one per cent solution of tuberculin, precipitated by ninety-five per cent alcohol. In positive cases congestion and lacrymation follow at the fifth hour, and fibrinous secretion is more or less abundant. The reaction ceases after eighteen hours in children and twenty-four to thirty hours in adults. There is but very slight reaction in negative cases and what little occurs is all over by the fifth hour. Repeated use of this method of diagnosis seems to show that it is as reliable as it is simple, and a really valuable addition to the methods of diagnosis available in tuberculosis.

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* Berlin, Klin. Woch., May 20, 1907, 644.

† Berlin, Klin. Woch., June 3, 1907.

‡ C. R. Acad. Sciences, CXLIV, 1907, 1324.

"WHITE ACID" FOR ETCHING GLASS. The use of gummed labels is inconvenient at best, and is especially so where sterilization is necessary. They may be avoided by the use of the so-called "glass pencils." But these are unsatisfactory and "mussy" and any good substitute would be welcomed. Probably the principal reason why the etching of test tubes, petri dishes, etc., so that an ordinary lead pencil may be used, is not more commonly practised, is because it has been difficult to find a satisfactory solution for etching the surface. Hydrofluoric acid does not give a smooth, even surface. In our experience we have secured excellent results by the use of a preparation which is sold to jewelers under the trade name of "White Acid." This may be made in the laboratory; the method is as follows: Neutralize hydrofluoric acid with ammonium carbonate, evaporate to dryness and dissolve the residue in hydrofluoric acid to make a saturated solution. Or if ammonium fluoride is available it may be dissolved directly in the hydrofluoric acid. The glass to be etched may be dipped into this solution for a minute or two, or the solution may be painted upon the glass, or it may be applied by means of a rubber stamp, if some lettering or device is required.

The solution should be allowed to dry upon the glass before it is washed off. The glass should be perfectly dry and there should be no moisture in the atmosphere of the room where the etching is done. The addition of borax (up to twenty-five per cent) to the final solution sometimes improves the result.

A NEW INDOL TEST. The test for indol production has long been more or less uncertain, unsatisfactory and variable. It may be that the observations of Rivas,* Bacteriologist to the Pennsylvania Department of Health, may throw some light on the causes of the unsatisfactory nature of this reaction. He finds that the ordinary indol test is sometimes positive in his sterile broth control tubes, from which the sugar was removed by the ordinary method of inoculation with *B. coli* cultures. He suggests that other organisms than *B. coli*, organisms which certainly produce no indol, be used in place of the *B. coli* for the removal of the sugar, especially in those cases where the medium is to be used for the determination of indol production.

The author also recommends the substitution of another test for the regular indol test. This new test may or may not be a test for indol, but, he says, it can be properly regarded as a test for something closely related to indol, or at least some derivative of indican. He claims the new test is more useful than the regular indol test, because of the ease with which it may be applied, and the short time needed for the growth of the culture before testing (24 hours). He believes that the reaction is diagnostic for the colon bacillus. The test is as follows: About 1 c.c. of a 10 per cent sodium hydroxide solution and about 1 c.c. of a 50 per cent sulphuric acid solution are added to a 24 hour broth culture. A bright purple or pinkish coloration results. This reaction is positive in dilutions of the indol-like substance as high as 1:1,400,000, and requires no special precautions such as the "ring" test, for the coloration is diffused and general.

These observations are interesting and should be repeated and tested by others.

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* Jour. Inf. Dis. IV, 1907, 641.

CHEMICAL LABORATORY NOTES

By **FRANKLIN C. ROBINSON**
Professor of Chemistry, Bowdoin College, Brunswick, Maine

FORMALDEHYDE DISINFECTION. In the October number of the Centralblatt für Bakteriologie, is an interesting report of an Austrian commission appointed especially to test methods of room disinfection with formaldehyde. They compared the convenience, efficiency and cost of such disinfection by the use of lamps to boil away the formalin, by the use of the solid mixture called "Autan," and by the use of potassium permanganate, the credit for which latter method they evidently intended to give, correctly, to the paper of Evans and Russell, issued by the Maine State Board of Health, but by some twisting they gave the names as Evans and Norris. The committee was working in the interest of military sanitation, and came to the conclusion, first, that any process involving the use of lamps has an element of danger which disqualifies it for military use. They object also to any process requiring the transportation of special apparatus. They find the fundamental objection to *autan* and all such solid substances is that they require special means for adding sufficient moisture to the air, and so their apparent simplicity of use is really complexity. Their experiments showed also that *autan* was uncertain in its results, that it deteriorates with age because the moisture of the air acts slowly upon it, and finally they found that *autan* was too expensive. They conclude by strongly recommending the Evans and Russell process by permanganate, as cheap, safe and efficient. They recommend, however, that in its use the formaldehyde be diluted one-half. (In the recent work of Evans, he approves such dilution in special cases, especially if the formalin used is full 40 per cent.) It is interesting in view of conflicting results of others, that this committee got satisfactory sterilization of sputum containing tubercle bacilli and also in case of cultures containing sporing anthrax.

THE SMOKE NUISANCE. It is but saying what every thoughtful man knows, that there is no problem for which there is a greater demand upon chemists for its solution than that of the smoke nuisance. We used to be fairly free from it in New England because of the general use of hard coal, but all that is now changed, and not only manufacturing plants, but, worst of all, our railroads are centers and lines of devastating influence in this respect. Laboratories of hygiene have not, as yet, regarded it as within their province to make experiments on this subject, but if things go on as they have been and no other relief comes they will be obliged to take it up. Not only is it an inconvenience to man, if not a direct poison, but also an injury to vegetation. Recent experiments in Germany show that, while sulfur dioxid in the air is not perceived by man in greater dilution than 1 to 50,000, it is decidedly poisonous to plants at a dilution of 1 to 1,000,000. And it is undoubtedly true that considerable areas of air near a railroad on which many trains a day run contain more than those limiting dilutions many times a day, for the soft coal used in locomotives has a large impurity of sulfur.

PEPTONE FORMED BY SALTS OF URANIUM AND THORIUM. B. Szilord * says that when egg albumin is put into a boiling solution of thorium or uranium nitrate (2 per cent) the particles first shrink, then swell and go into

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* Jour. Chim. Physique, 5, 1907.

solution, and the solution gives the reactions for albumose and peptone.

It will be interesting to find out whether this property of these salts is in any way connected with their radio-activity.

SODIUM THIOSULFATE AS AN ANTIDOTE TO MERCURY POISONING. A recent article explains the greater efficiency of sodium thiosulfate over simple sulfids as an antidote to mercury poisoning, as due, not to the quicker formation of insoluble mercury sulfid, but to the formation of an *ion* containing mercury, which, though absorbed, is not an active poison.

PERSONAL HYGIENE

By PERCY G. STILES, Ph.D.
Instructor in Physiology, Massachusetts Institute of Technology

FATIGUE SUBSTANCES AS STIMULANTS. It has been known for forty years that the decomposition products which are formed in contracting muscles may diminish the working power of these muscles, and that they may be carried in the circulation and extend their depressing influence to resting tissues. In this class of toxic compounds we recognize carbon dioxide, paralactic acid, and potassium di-hydrogen phosphate. Other waste products probably exist, but have not been identified. Attention has recently been called to a new aspect of these substances. Dr. Frederic S. Lee * of Columbia University has proved that the same cell products, which in large amounts lower the irritability and the working capacity of muscles have a positive stimulating effect when the concentration is low. This makes intelligible the phenomenon known as the Treppe (the increasing height of the first few contractions in a series caused by equal stimuli). The process in daily life which is analogous to the Treppe of the laboratory is what we call "warming up." According to Dr. Lee's results a muscular mechanism is not in its best condition for work when most thoroughly rested, but rather when by moderate activity it has generated within itself stimulating products in a moderate amount. But in actual experience there is of course another and probably a more important element in the "warming up" process, namely

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* American Journal of Physiology, 1907; XVIII, 267; XX, 170.

the improvement in the circulation due to mechanical effects of the movement.

The conception that fatigue products at first favor activity and only later retard it may be of great value in clearing up various hygienic problems. Take for example the explanation of sleep. The lapse into unconsciousness after the customary hours of waking may be primarily due to cerebral anæmia produced by the failure of the vaso-motor center to maintain full activity, as Dr. Howell supposes. But back of this direct cause lies the general question of fatigue products and their action upon the system. Upon the old assumption that such substances must always be depressing it was difficult to see why the efficiency of the body did not steadily decline from a maximum early in the day to evening levels little above that of sleep. That the general command of mental faculties and muscular resources is often at its best in the evening was not easily explained. The facts of the case are readily covered by Dr. Lee's observation. It is perfectly conceivable that nerve-centers, as well as muscle fibers, may be rendered irritable by the same chemical agents which will later narcotize them.

An important matter which has been investigated by Dr. Lee is the question, whether the acid character of fatigue substances is the sole cause of their action. That it is one cause seems clear, for many different acids besides those naturally formed in muscle have qualitatively the same influence. That it is not the only cause seems equally plain, since a neutral lactate shares in a great measure the effects obtained with lactic acid.

A THEORY OF FEVER. Dr. Arthur R. Mandel * of the Bellevue Medical School has recently published results which extend conclusions reached by him in 1904, and lead to a peculiarly interesting and tangible theory of the cause

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* American Journal of Physiology, 1907, XX, 439.

of fever temperatures. He has found that the high temperatures commonly observed after surgical operations (but in the absence of infections) are attended by a marked increase in the xanthin bases of the urine. By means of experiments upon a monkey he has shown that xanthin and its homologues cause a marked rise of temperature when introduced into the circulation. Under normal conditions the xanthin bases produced by cell-metabolism and those derived from the food are very largely oxidized to uric acid. This latter body, though it is held responsible for much mischief in the human frame, does not upset the mechanism which regulates heat production and heat loss.

Dr. Mandel believes that after a surgical operation the production of xanthin bases from the injured tissue is often so great that their transformation into uric acid is far from complete. The excess of unchanged nuclein bases constitutes the specific poison which acts upon the nerve-centers having to do with temperature regulation, perverting their influence and establishing for the time an abnormal standard to which with disastrous results the system is stubbornly held. The author points out that in fevers due to infection, the xanthin bases may play the same part. The toxin may not directly affect the heat-centers, but by changing the course of metabolism it may increase the production of xanthin bodies or hinder their oxidation. The secondary effect will then be identical with that in "aseptic" fever. The "heating" property popularly ascribed to meat and its well-recognized unfitness for the fever patient's dietary are naturally recalled.

VETERINARY HYGIENE

By **VERANUS A. MOORE, B.S., M.D.**
Cornell University, Ithaca, N.Y.

THE CONTROL OF BOVINE TUBERCULOSIS. The Cornell University Agricultural Experiment Station has recently issued a bulletin on bovine tuberculosis in which the nature of the disease and methods of control are discussed. The three methods for the elimination of bovine tuberculosis are recommended: First, the destruction of all advanced cases. Second, the slaughter for beef under proper inspection of animals fit for food providing the disease is localized. Third, the application of the Bang method for the purpose of replenishing the herds with sound animals from the tuberculous stock. In addition to these, some principles to be observed in the elimination of the disease are given. These are based on the principle that if the spread of the virus is checked the disease will promptly disappear. The elimination of the disease from extensively infected districts implies a change of method in the handling of cattle. The dairymen's attention is called to the consideration of the following conditions:

1. There are some cattle suffering with advanced tuberculosis. These are of no value, but a menace to the health of the herd, and consequently should be promptly destroyed.

2. There are many infected, though but slightly diseased, that are poor milk producers, but which do have a good beef value.

3. There are presumably many valuable strains of cows and many high-bred animals that are infected though but

slightly diseased. The value of these animals is in their offspring quite as much or more than in their milk production. The Bang method affords a means for preserving these animals and procuring their offspring without danger to others.

4. There are large numbers of uninfected herds, and many cows in the infected one, that should be *carefully protected* from infection.

5. Tuberculosis cannot spread unless the bacteria that produce it are brought by some means to the uninfected animals. They are most commonly carried by infected individuals or their products.

As it is to the advantage of every cattle owner to have a sound herd, the greatest progress will be made in the eradication of tuberculosis when the greatest number of owners take up the work of elimination for themselves, with the aid of competent veterinary advice. The first steps to be observed in the procedure against tuberculosis may be summarized as follows:

1. Promptly eliminate from the herd all animals that have tuberculous udders or that give evidence of being tuberculous. This will greatly reduce the danger from the milk.

2. As soon as possible have the tuberculin test applied to all the remaining animals to ascertain which individuals are infected. These are the ones that are still dangerous to the herd.

3. Separate the well animals from the infected animals. When the reactors are pointed out, the most economic method of dealing with them must be determined from the local conditions.

4. The stables in which the diseased cattle were kept should be thoroughly disinfected.

5. The non-reacting animals should be tested every six months until all those previously infected are detected and removed. This will leave a sound herd which will remain so if properly protected.

6. In buying cattle, great care is necessary not to bring infected animals into the sound herd. They should be carefully tested with tuberculin, and retested in three to six months, and all reactors removed.

7. It may be found desirable, in order to replenish the herd with sound animals, to modify present methods and raise more calves, and to add a smaller number of cows by purchase. The first purpose is to obtain a sound herd, and it may be possible that the quickest and cheapest method will be to raise it.

MUNICIPAL SANITATION

By **CHARLES V. CHAPIN, M.D.**
Superintendent of Health, Providence, R.I.

FREE PUBLIC MEDICAL SERVICE. Newsholme, in a paper read before the British Medical Association, at its 1907 meeting,* sets forth very forcibly the evils attendant upon our present haphazard system, or the rather lack of system, of medical service. He does not believe that hospital abuse, contract work, and the fierce competition, and the small compensation of medical practitioners among the poor, can ever be remedied along existing lines. An enormous amount of disease and death among the poor, and those in moderate circumstances, is due to the fact that for these classes early and efficient medical care cannot be obtained. There is also a considerable waste, owing to the lack of co-ordination between the various charitable and municipal medical services. The remedy is for the municipality to furnish free medical service to all who desire it, just as education is now furnished. Newsholme sees no reason for expecting pauperization as the result of free medical service any more than as the result of free teaching. He believes that this municipalization of the medical service is demanded in the interests of preventive medicine. It may be possible to advocate such a scheme in England, but it is to be feared that its discussion in the United States would come to naught.

A FRESH AIR SCHOOL. On January 27 the city of Providence opened a fresh air school, for the instruction chiefly of children living in tuberculous families. It is designed for susceptible children and closed cases of tuberculosis, though a few open cases might possibly be admitted. It is an entirely municipal undertaking, except that lunches and sitting-out-bags have been furnished from private sources. The school opened with ten pupils, and there are now eighteen in attendance. An old school-building near the center of the city was utilized by removing the south wall of one room and filling in the opening with sash, hung at the top, so that the whole space can be left open to the air. A stove is set up in the other corner of the room for heating soapstones, warming soup, etc. The school inspectors have the medical direction of the school.

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* British Med. Jour., Sept. 14, 1907.

RESPONSIBILITY FOR THE REPORT OF BIRTHS. Dr. William H. Guilfoy, of the New York City Department of Health, calls attention to an error in the last number of the Journal. It was there stated that the Supreme Court had decided that it was not sufficient for a physician to mail the report of a birth: he must see that it was actually received by the health department. This was the opinion of the Dissenting Justice, not of the Court.

CONTROL OF MEASLES. The closure of schools on the appearance of the first case of measles was referred to in the last number of this Journal. Woolwich, one of the burroughs of London,* was divided into two districts, in one of which was adopted this method of immediate closure for measles, while in the other, the schools were not closed, but all children in infected families were excluded. This experiment was carried on for three years, 1903–1906, and it is stated that the prevalence of measles was greatly limited in the first district. Usually in London, children from infected families are allowed in school if they have had measles and, according to McVail,† when a child first enters school, it is recorded whether or not he has previously had measles. The question of the value of disinfection after measles is discussed by Brown, Medical Officer of Health of Bermondsey, London.* He concludes that only a very small number of cases can possibly be attributed to contagion remaining on things, or in the house after recovery, and that, therefore, disinfection is unwise, as it can accomplish no appreciable good, and is expensive and annoying.

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* Report of the Medical Officer of Health of the County of London, 1906, 29.

† Prevention of the Infectious Diseases, Macmillan, 1907, 140.

A DENTIST FOR SCHOOL CHILDREN.† The city of Liverpool has recently provided a dentist at a salary of $750 per annum for the day industrial schools, which have an attendance of about 1,300 children.

NOVEL USE OF TRANSFERS. The backs of street-car transfers used in Baltimore during February, and those used on Sundays during March, will contain a brief tuberculosis circular.‡

CITY MILK CONTESTS. A recent publication of the Department of Agriculture § describes a prize contest which was held in Cleveland last year. Prizes were offered for milk, cream and general farm conditions. The contest was held under the joint supervision of the United States Department of Agriculture and the Municipal Health Department, and the prizes were offered by the Chamber of Commerce. The contest was most successful as means of educating producers and handlers of milk, and instructing the public as to what clean milk really means.

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* Public Health, January, 1908, 257.

† Public Health, January, 1908, 275.

‡ Journal of the American Medical Association, Jan. 4, 1908.

§ Cir. 117, Bureau of Animal Industry.

SANITARY ENGINEERING NOTES

By **ROBERT SPURR WESTON**
Assoc. M. Am. Soc. C. E.

STUDIES OF SEWAGE DISTRIBUTORS FOR TRICKLING FILTERS.* The article is a comprehensive study of the general problem of sewage distribution, with a comparison of the efficiency of distributors of various types. An extended account of experiments with gravity distributors is given, and the efficiency of the best of these is compared with the Old Salford and the New Salford, Birmingham, Columbus and Waterbury, with accompanying tables. The methods of measuring this efficiency and of calculating its coefficient are adequately explained.

THE PREVENTION OF STREAM POLLUTION BY STRAWBOARD WASTE.† The present methods for disposal of waste liquor from strawboard manufacture, which amounts to about 65,000 gallons of waste, containing 1,173 pounds of straw and mineral matter and 490 pounds of lime for each ton of the product per year, are inadequate. Mr. Phelps has carried on experiments at one factory for the satisfactory removal of the sludge at an economical price. His summary of the article is chiefly as follows:

The present method for the treatment of the waste liquor, that of sedimentation in large fields, is unsatisfactory and expensive, and it proceeds on a wrong principle. Filtration of the liquor through sand, so-called mechanical filtration, but without coagulants, after a short period of sedimentation will remove 93 per cent of the suspended organic solids and 98 per cent of the total suspended matter determined as turbidity. The resulting effluent can be discharged into an equal volume of reasonably pure water without creating a nuisance. In particular, there will be no sedimentation or organic matter. If its discharge into a seriously polluted stream should bring about precipitation of sewage matter and consequent nuisance, the blame should in all equity be fixed upon those contributing the sewage. The sludge resulting from the sedimentation tanks, after pressing or spontaneous drying, is innocuous and makes good soil. It has some value as a fertilizer and is particularly valuable to mix with the clay soils of the middle West to render them more porous. Other uses of the materials, as cheap dye or substitute for papier-mache, are further suggested, but they need further study. The cost of the entire process is sufficiently low to admit of its adoption wherever stream pollution is serious.

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* Winslow, Phelps, Story and McRae, Technology Quarterly, XX, 325.

† E. B. Phelps, Technology Quarterly, XX, 292.

SEWAGE SYSTEM AND SEWAGE DISPOSAL WORKS AT KEW BEACH, TORONTO, CANADA.* A short account of the sewers and disposal works, and cost of same ($66,888), installed at a summer resort on the shore of Lake Ontario.

REMOVAL OF MANGANESE FROM DEEP WELL WATER.† Like other towns in that part of the world, Arad, Hungary, suffers from a lack of good drinking water. Wells sunk in 1895 were found to contain only slight traces of iron, which was removed by aeration, and the Fischer system of porous-tile filtration. After a number of years, deposits of manganese were found in the distribution system, although none was found in the collecting reservoir connected with the well system. A pressure mechanical filter was placed between the reservoir and the distribution system and so far has removed the manganese. The deposit in the pipes consists of 71.02 per cent of MnO_2 and 5.95 per cent of MnO. It is interesting to note that most of the manganese was precipitated upon the galvanized iron strainers of the water meters, while copper or brass strainers were but little clogged up. There was very little deposit in the service pipes, but in the force main there were numerous brown clots on the upper surface of the pipe and a deposit on the bottom of about 1 mm. The water has a hardness of 140 parts per million, and the addition of milk of lime would effect a more complete removal of the manganese than does the pressure filter.

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* C. H. Rust, Eng. News, 58, 386.

† Eng. Rec., 56, 517.

WATER POLLUTION IN THE OSWEGO AND UPPER HUDSON RIVER DRAINAGE AREAS.* Comprehensive investigations of important streams in New York State have recently been made by the State Sanitary Department, of which this article contains some abstracts. The condition of the main stream of the Oswego is bad, though sedimentation in the numerous lakes mitigates pollution to some extent. On the Upper Hudson industrial wastes affect almost exclusively public convenience and comfort, but do not endanger life. There seems to be promise of more practical results from these efforts than usually follow such. Statements have been sent to the city officials for enforcement of sewage-purification laws, but the future may require more complete methods than at present insisted upon.

REPORT ON SEWAGE DISPOSAL OF THE CALUMET DISTRICT THROUGH THE CHICAGO DRAINAGE CANAL.† Two methods of purification are proposed and compared: first, by use of sprinkling filters; second, by repeating the method now used in Chicago, namely, building a canal from the Calumet River across the low divide to join the present Sanitary and Ship Canal at Sag, and by reversing the flow of the Calumet River to carry in it sufficient water to properly dilute the sewage. Mr. Hering proposes the second as more economical and more advantageous in other ways.

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* Eng. News, 58, 484.

† Mr. Rudolph Hering, of Hering & Fuller, N.Y., Eng. News, 58, 501.

WATER SUPPLY AND SEWERAGE OF THE NEW INDUSTRIAL TOWN OF GARY, IND.* A description of the sanitary engineering work in Gary, which consists of a water supply taken through a town extending into Lake Michigan and pumped to a standpipe. The sewerage is on the combined system, and storm overflow will discharge into the Calumet River. The ordinary flow will be pumped to a suitable purification site nearby. Intermittent filtration preceded by sedimentation is recommended as the best means of disposal.

NOTES ON ORIENTAL WATER SUPPLIES.† In this paper are given briefly the salient features of some oriental water works, such as source of supply, size, style and capacity of filters, with date and cost of construction, also interesting data in comparison with those relating to American supplies. Greater detail on Japanese works is given by the author in the *Engineering Record*, 55, page 562.

"COMPOSITION OF THE DEAD SEA WATER."‡ The authors compare two analyses of Dead Sea water, one made in 1857, one in 1907. Salt contents were 22.30 and 22.02 per cent, respectively. The 1857 sample had decidedly less potassium and less sulphates. The Dead Sea water is characterized by the high amounts of easily soluble chlorides, especially of Mg and Na which it contains.

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* Eng. News, 58, 489.

† George A. Johnson, Paper read at the Twenty-seventh Annual Convention of the Am. W. W. Association.

‡ A. Stuzer and A. Raich, Chem. Ztg., 31, 845, 1907

"MANGANESE IN THE BRESLAU GROUNDWATER SUPPLY." * This is one of many articles which have appeared in the chemical and engineering press about the occurrence of large amounts of manganese in the new groundwater supply of Breslau. The authors are chemists and have charge of experiments which are being made to ascertain the best means of removing the manganese from the water in question. They note that this is the first time that a main water works in a large city has been troubled with manganese. To be sure, manganese usually accompanies iron in groundwater. Such a composition is frequently met with in north Germany. At Hanover, manganese is precipitated from the water as an hydrated oxide. Manganese is present in arable soil in many silicates, in the tertiary rocks and in almost all plant ashes, especially those from oak wood. Some bog iron ores were found to contain as much as 20 per cent of manganese. The wells at Breslau were sunk through the alluvium into water-bearing sand. The material comprising the alluvium was rich in manganese. When the wells were first put into use, the amounts of manganese after the usual treatment for the removal of iron were not noticeable, but after the Oder River had overflown the ground in which the wells were sunk manganese was washed from the upper layers of the soil into the water-bearing strata, and soon became so high in amount that the wells had to be put out of service. On the average the water from the wells contains about eight parts of manganese per million. The authors note the necessity of purifying this water because of the lack of other satisfactory sources of supply, and the following processes have been or are now being tried:

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* H. Luehrig and A. Blasky, Chem. Ztg., 31, 255.

1. Precipitation by potassium permanganate. This process is too costly.

2. Electrolitic processes. These effect good results, but are far too costly.

3. Precipitation by mixing with a dark-brown water or with humous matter of various kinds, as is practiced with success at Posen.

4. Purification by means of calcium aluminum silicate. This process takes a long time and the silicate costs over ten cents a pound.

5. Precipitation as hydrated oxide. This seems to be the best principle to work upon. Either KOH or NaOH work very well but are costly. Calcium acetate is some better than these. The addition of lime to a slight excess effects the removal of the manganese in a satisfactory manner and is the cheapest of all the processes. The authors believe that in practice the procedure will be as follows:

a. Iron removal by aeration and filtration.
b. Mixed defecated water with lime water.
c. Aeration.
d. Sedimentation.
e. Filtration through sand and gravel.
f. Filtration through fine sand filter and treatment with CO_2.

CANADIAN NOTES

By JOHN A. AMYOT, M.D.
Bacteriologist Provincial Board of Health, Toronto, Ontario

ADVANCES IN PUBLIC HEALTH IN WESTERN CANADA. Public Health work is advancing rapidly in the three western provinces of Canada.

In the old Province of British Columbia, under Dr. Fagan's stimulation, the fight against tuberculosis is progressing well. The popular subscription to supplement the government's aid last month had reached the magnificent sum of $80,000, and promises to become quite large.

The two-year old Province of Alberta has established a provincial university, to which a medical faculty will be attached. It has framed a medical act to regulate the entrance to the practice of medicine, and to provide a curriculum for the University. A Public Health act has been put through and a Public Health Laboratory established at Edmonton, under the direction of Dr. Revell, formerly of Chicago University. Large hospitals are being built at Edmonton and at Calgary.

Its twin Province of Saskatchewan is also moving for a University. It has a working public health act, and a well-equipped laboratory, under the direction of Dr. Charlton at Regina. In that city also a fine new hospital is about to be opened.

The now already old province of Manitoba, not to be left behind, has a fine working public health laboratory in the University building at Winnepeg, under the direction of

Dr. Bell. A dairy by-law to supervise milk as it comes from the dairies, and the subsequent handling and disposal of the same, especially in restaurants and boarding-houses, has gone through. At Selkirk, Brandon, and at Winnepeg fine new hospitals are to be opened. The health authorities are earnestly at work preparing for the coming meeting of the American Public Health Association at Winnepeg, next summer, both as to scientific work and entertainment.

IMPROVEMENT IN PSYCHIATRY IN ONTARIO. The Ontario government is at the present moment carrying out a plan developed during the last two years, to make improvement over the conditions that existed previously in the eight asylums for the insane of the province under their direct control.

Many insane were previously housed in the jails. Increased accomodation has been and is being provided in the asylums for these, to prevent any continuance of this very undesirable condition.

The regular asylums contained many senile and harmless dotards. These took the place of those that should have their rooming for treatment. Provision for these will be made in the county and municipal almshouses and homes.

The epileptics will be cared for at Woodstock. The idiots and imbeciles will be looked after at Orillia. The old chronic and more or less harmless ones will be taken care of at Brockville.

The cottage plan of building will be more followed than heretofore, so that in each of the asylums treating the more or less acute, the violent and the curable cases, isolation and classification will be facilitated.

For the acute, and especially the incipient, cases clinics are being established in connection with the general hospitals in the larger centers, such as Toronto, London and Kingston, and in Toronto a special psychiatric clinic, for the special study of certain forms of insanity and for teaching purposes, is to be established. This last will be under the direction of Dr. C. K. Clark, who has lately been made Professor of Psychiatry in the University of Toronto. Investigation laboratories are being established under the direction of special pathologists in each of the large asylums.

Much benefit, and justly so, is expected to result from these decided improvements.

The Hon. Mr. Hanna, the minister of the government, under whose charge this department of charities falls, will certainly receive the commendation he so richly deserves for his work in this regard, when it is properly appreciated.

PURE WATER AT MILITARY CAMPS. At the various militia camps in Ontario during the last few years considerable trouble has been experienced with water supplies. The Militia Department at Ottawa is taking the subject seriously under its consideration. All attached medical officers are required to take special work now in health laboratory work, to fit them to intelligently supervise the protection and correction of water supplies. It is proposed to establish regular sewage disposal works and water filters at the permanent camp at Petawawa as a beginning, and then it is hoped to do the same at the other camps in this province at Niagara, London, etc.

PURE WATER IN TORONTO. Toronto is on the verge of submitting a by-law for the purification of its water supply from Lake Ontario. The question yet to be settled is whether this is to be by sewage disposal or by slow sand filtration. It is to be hoped the latter prevails.

PUBLIC HEALTH LEGISLATION, NEWS AND NOTES

By F. H. SLACK, M.D.
Assistant Director Boston Board of Health Laboratory

PURE MILK IN RICHMOND, VA.* The Richmond City Council last year voted $2,000 for the sanitary improvement of the milk supply. This became available late in March. Plans were at once presented to the Board of Health, approved by them, a Dairy Inspector was elected and all was in readiness for the start, which was made the first of May.

The main features of the work have been (1) dairy inspection, (2) bacteriological examination of milk samples, (3) educational work, both among the dairymen and the public, and (4) suspension or revocation of permits for selling milk in those cases in which all efforts to secure improvement, by educational and persuasive methods, proved unavailing.

The score-card recommended by the United States Department of Agriculture was adopted and has been of untold value.

The records of the Dairy Inspector show that 118 dairy farms have been inspected and scored, of which ninety-two are now supplying milk or cream to the city. Of the other twenty-six, six were refused permits on account of not being up to requirements, eight permits were revoked, twelve went out of business rather than meet the requirements.

In six months there have been built sixty-seven new milk houses, and twelve are now ordered. Few of the dairies had "aerators" for cooling their milk, now all have them. Eleven new cow barns have been built and eight are now under construction.

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* Monthly Bulletin of Richmond Health Dept., October, 1907.

Improvement in the milk supply has been marked. In May only 29.3 per cent of all the dairies inspected scored over 50 per cent, while in October 76.3 per cent scored over 50. In May nearly half of the dairies (48.3 per cent) scored under 40 and 13.8 per cent were under 30, while by September both these classes had been eliminated.

SANITATION IN CUBA.* J. R. Kean, adviser to the Sanitary Department, in a letter to the Provisional Governor, states that, "There can be no doubt that the delay in organizing the National Sanitary Service after the establishment of the Cuban Republic, as well as the loss of the sanitary chiefs by the withdrawal, on May 20, 1902, of the American officers, who had been engaged in that work, made an unfortunate lapse in sanitary work throughout the island, but less in Havana than elsewhere.

Reports of local health officers a year ago show inadequate appropriations and gross sanitary neglects. A considerable number stated that all sanitary services in the municipality were at an end.

The sanitary service of the City of Havana was supported from the national treasury with lavish liberality, and was very efficient. The Cuban government also contributed to the sanitary expenses of fourteen other cities, in the budget of the fiscal year 1906–7, the sum of $652,000, with an additional item of $200,000, which was to be expended for the sanitation of cities, at the discretion of the executive.

It is evident that the important sanitary work of the island was supported by the national treasury rather than by the municipal governments. The entire failure of the latter in this respect was well recognized in Cuba, and several laws were proposed in the Cuban Congress looking to the nationalization of the municipal sanitary services.

The assumption by the State of the entire control of municipal sanitation was effected by decree No. 894, signed August 26, of this year.

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* A M. A. Journal, Jan. 25, 1908.

The principal objects accomplished by this law are:

1. The abolition of the municipal boards of health, and the transfer of all powers previously vested in them, to a national official, the local sanitary officer, who is appointed by the highest executive authority.
2. The assumption by the State of the cost of all municipal sanitary works and services, with the proviso that the municipal governments shall refund to the State, in consideration thereof, one-tenth of their total incomes for each year.
3. An increase in the powers of the chief sanitary officer, who is made, in fact, the administrative authority of the department. The Superior Sanitary Board is at the same time reduced in number and authority, a majority of its members being members *ex-officio* of the National Sanitary Board. The role of the new National Sanitary Board will be rather advisory than administrative.

ISTHMIAN CANAL REPORT.* Wm. C. Gorgas, chief sanitary officer of the Canal Zone, prefaces his December report to the Acting Chairman of the Isthmian Canal Commission with the following letter:

Sir: I herewith forward report of the Sanitary Department for the month of December, 1907. There has been a slight improvement in most all the rates over that of November. The annual death rate for November, for all employees, was 20.66; that for December, 18.11. For the total population the death rate for November was 28.86; that for December, 28.50 — almost the same.

I invite attention to the great difference in the death rate between the Canal Zone (American territory), 21.67 per thousand, and the Panama territory, located in the same Zone (the towns of Panama and Colon), 36 per thousand.

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* Report of the Department of Sanitation of the Isthmian Canal Commission for the month of December, 1907.

The sick rate among the employees shows a slight improvement for December over November, December being 19.76 and November 20.49.

Comparing December of this year with December of 1906, a marked improvement is noticed. The annual death rate for December, 1906, was 30.27 per thousand; that for December, 1907, 18.11 per thousand, an improvement of nearly 12 per thousand. Taking the whole population of the Zone, including the towns of Panama and Colon, the annual death rate for December, 1906, was 39.21 per thousand. The same rate for December, 1907, was 28.50, an improvement of over 10 per thousand.

The sick rate for December, 1906, among the employees was 30.57 per thousand; for December, 1907, 19.76 per thousand; an improvement of over 10 per thousand between the two years — that is, that last year where we had three men sick from our employees all during the month of December, in the same time this year we had only two sick.

There has been a very marked decrease in malaria during the year. Considering the deaths caused by disease among our laboring force, I find that last December, with a force of 29,000 men, we had 13 deaths from malaria. This December, with a force of 45,000 men, we had six deaths from malaria.

In considering the number of cases of malarial fever the ratio is about the same. Last December we admitted into our hospitals 1,617 cases of malaria; this December, 801. Considering the size of the force during the two years, we had just one-quarter as much malaria this December as last December.

We had no cases of yellow fever, smallpox, or plague anywhere on the Isthmus during the month. It has now been two years since yellow fever has disappeared from the Isthmus.

I consider yellow fever and malaria accurate measures of the effectiveness of the sanitary work done, and I submit these figures as showing that the work of the Department during the month has produced the desired results.

PROPOSED LEGISLATION IN VIRGINIA.* A Bill to Provide for Teaching in the Public Schools the Modes by which the Dangerous Communicable Diseases are Spread, and the Best Methods for the Restriction and Prevention of such Diseases.

SECTION 1. That there shall be taught, in every year in every public school in Virginia, the principal modes by which each of the dangerous communicable diseases are spread, and the best methods for the restriction and prevention of each such disease. The State Board of Health shall annually send to the public-school superintendents and teachers throughout this State, printed data and statements which enable them to comply with this act. School boards are hereby required to direct such superintendents and teachers to give oral and blackboard instruction, using the data and statements supplied by the State Board of Health.

SECT. 2. Neglect or refusal on the part of any superintendent or teacher to comply with the provisions of this law shall be considered a sufficient cause for dismissal from the school by the school board.

Any school board wilfully neglecting or refusing to comply with any of the provisions of this act shall be subject to a fine, the same as for neglect of any other duty pertaining to their office. This act shall apply to all schools in this State, including schools in cities or towns, whether incorporated under special charter or under the general laws.

CALIFORNIA. Inspectors appointed.† The State Board of Health has appointed five inspectors whose duty it is to inspect the bodies of the dead of the coast and bay cities and counties, where there are suspicions that bubonic plague existed.

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* Bulletin of Virginia Board of Health, November, 1907.

† Journal A. M. A., Jan. 4 1908.

MINNESOTA. Free Vaccine Virus.* On and after January 1, the State Board of Health will distribute vaccine virus free to health officers throughout the State.

NEW YORK. Rabies in Rochester.† The entire county of Monroe has been quarantined because of the positive proof that this disease was in Rochester and the surrounding towns. This rigid quarantine was considered necessary because so many dogs at large have bitten live stock, etc.

MASSACHUSETTS ANTIVIVISECTION BILL. We understand from a reliable source of information that an antivivisection bill introduced at the beginning of the present session of the legislature has been withdrawn by the petitioners. *Heu prisca fides!*

STERILIZATION BY LIGHT.‡ Dr. Carmine Cianci, of the University of Naples, describes an efficient method for sterilizing gelatine ophthalmologic discs. Small glass tubes, each holding several discs, were placed in a glass petri dish, ten inches distant from a twenty-five candle-power acetylene gas flame with parabolic metal reflector. The temperature did not rise much above 90° F., so that there was no need of a solution of alum to absorb the heat. Exposure was intermittent according to convenience, total exposure varying from twenty hours for uninfected discs to sixty hours for discs infected with *Bacillus anthracis* and then incubated. The discs were completely sterilized and the alkaloid in them was not in any way altered by the exposure to light.

(Abstract by Calvin G. Page, M.D.)

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* Journal A. M. A., Jan. 4, 1908.

† Journal A. M. A., Jan. 4, 1908.

‡ Giornale Internazionale delle Scienze Mediche, Vol. XXIX, 1907.

COMMUNICATIONS

(In accordance with a vote of the Council of the Laboratory Section, the following letter was prepared by the Secretary and sent to every member of the section.)

To the Members of the American Public Health Association,
Laboratory Section.

Gentlemen: At the Atlantic City meeting of the American Public Health Association, the Laboratory Section, after considering in Committee of the whole, the report of the Committee on Technical Progress (see constitution of Laboratory Section, Trans. 1905, or Supplement No. 2, Journal of Infectious Disease, May, 1906), voted that the council of the Laboratory Section proceed to secure Technical Committees on Standard Methods and Interpretation of Diagnostic and other procedures relative to public health work, thus extending the admirable work already accomplished by the Committee on Standard Methods of Water Analysis, and the Committee on Standard Methods of Bacterial Milk Analysis, to the other important hygienic laboratory technicalities. The council was directed to prepare and forward to each member of the section a list of proposed subjects on which such committees might be formed, to invite each section member to signify his first, second and third choices of committees, and to ask each member to consider that the expression by him of such preferences would carry with it the earnest intention and desire to work directly upon the subject matter of the committees selected, using every endeavor to contribute material, advice, or direct experimental work, as the necessities of the case may require, to the report of his committee, in order that a report standardizing the best practice of hygienic laboratories of the country may be prepared.

This work must necessarily extend over several years. The first year's report might well be restricted to a review of the existing methods; the second year's report might well be restricted to the result of work directed to determining which is the most rapid, accurate and efficient procedure; the third to the final recommendations of the committee; but each committee will be entirely free to conduct its own work as it sees fit.

When the replies to this letter are received the council, working under rules already in force, will select from those volunteering on each subject a chairman and committee to deal with it. The names of the chairmen selected will be published, but the names of the members will not appear until the first report of the committee is received.

The reasons for this method of selecting committees are as follows:

1. Heretofore committees have been selected directly by the council, without consultation with the appointees, with the result that the members selected were often, and for various reasons, such as change in the natural trend of their own laboratory work, changes in their functions or staff, etc., quite unable to act.

2. Such appointment carried with it no agreement that the member selected would take interest in the committee work, even though his own work tended in the same direction.

3. Since a committee that does not work is worse than useless, an aggressive and constructive policy demands that the committees be so formed as to secure as members those not only capable but also willing and earnest in their convictions as to the value and need for any particular work, rather than those who while capable do not wish to undertake it for any reason, such as existing excess of routine or other work in their own professional fields, etc.

4. The section wishes to try this method of selecting technical committees, not in the belief that it is a final or perfect method of selection, but with the reasonable hope that it will prove, with the harmonious co-operation and forbearance of all concerned, at least a practicable working method to meet the existing calls for organized scientific professional work among public health laboratory workers.

Certain sections of the constitution which show the definite co-ordination of this plan, and also the flexibility of the committees and their responsibilities to the section are Sections 2, 4, 27 (1st two par. only), 28, 29, 30 (see Constitution, Laboratory Section Transactions, Part II, 1905).

It is sincerely hoped that all public health laboratory workers will recognize the earnest effort which lies at the basis of this policy, and co-operate in this solution of the problem.

The subjects on which the council desire that you express your preference are as follows:

A. Committees already appointed for this year.

1. Standard Methods of Water and Sewage Analysis.*
2. Standard Methods of Bacterial Milk Analysis.

If you are particularly interested in the above work, an expression to that effect should be made in order to guide the council in making appointments another year, and that such men might have the opportunity of acting as associates during the present year.

B. Proposed Committees.

3. Standard Methods of Chemical Milk Analysis.
4. Standard Methods of Bacterial Diagnosis of Diphtheria.
5. Standard Methods of Bacterial Diagnosis of Typhoid.
6. Standard Methods of Bacterial Diagnosis of Tuberculosis.
7. Standard Methods for the Diagnosis of Rabies.

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* Since the above was written the Council has voted to restrict the work of the present committee to chemical methods and to establish a committee to consider Bacterial methods.

8. Standard Methods for the Diagnosis of Syphilis.
9. Standard Methods for the Diagnosis of Glanders.

(On the above, interpretation of results will receive attention as well as technique.)

10. Standard Methods for the Preparation of Diphtheria Antitoxin.
11. Standard Methods for the Preparation of Vaccine.
12. Standard Methods for the Preparation of Tuberculin.
13. Standard Methods for the Preparation of Mallein.
14. Standard Methods for the Bacterial Analysis of Air.
15. Standard Methods for testing Embalming Fluids.
16. Committee on Mailing Infectious Material.

Suggestions to the council for any advantageous or progressive modifications of the plan adopted this year for incorporation in later work will be highly welcome.

A prompt reply will very greatly facilitate the work.

For the Council,
(Signed) B. R. RICKARDS,
Secretary, Laboratory Section.

November 11, 1907.

EDITOR AMERICAN JOURNAL OF PUBLIC HYGIENE,
Boston, Mass.

Dear Sir: As a member of the Executive Committee of the American National Red Cross, I have been requested to forward to you the enclosed Resolutions, with the hope that you may find it expedient to kindly print them in your publication and lend what assistance you can in discharging the international duty assumed by this country, in agreement with all the great powers, of protecting the Red Cross name and insignia from any use save that agreed upon by the Treaty of Geneva.

In cases where the name and insignia are used as trademarks, the suggestion would be of value that their use should be gradually eliminated, within the next three or four years, in conformity with the provisions of the Treaty that the prohibition of the use of the emblem and name should be enforced not later than five years after the Treaty went into effect.

Very truly yours,

R. M. O'REILLY,

Surgeon General, U.S. Army, and Member of the Executive Committee, the American National Red Cross.

(Resolutions adopted by the Executive Committee of the American National Red Cross, October 18, 1907.)

WHEREAS, By international agreement in the Treaty of Geneva, 1864, and the revised Treaty of Geneva, 1906, "the emblem of the Red Cross on a white ground and the words Red Cross or Geneva Cross" were adopted, to designate the personnel protected by this Convention, and

WHEREAS, The Treaty further provides (Article 23) that "the emblem of the Red Cross on a white ground and the words Red Cross or Geneva Cross can only be used, in time of peace or war, to protect or designate sanitary formations and establishments, the personnel and material protected by this Convention," and

WHEREAS, The American National Red Cross comes under the regulations of this Treaty, according to Article 10, "volunteer aid societies, duly recognized and authorized by their respective Governments," such recognition and authority having been conferred upon the American National Red Cross, in the Charter granted by Congress, January 5, 1905, Sec. 2, "The corporation hereby created is designated as the organization which is authorized to act in matters of relief under said Treaty," and, furthermore,

Whereas, In the Revised Treaty of Geneva, 1906, in Article 27, it is provided that "the signatory powers whose legislation should not now be adequate, engage to take or recommend to their legislatures such measures as may be necessary to prevent the use by private persons, or by societies other than those upon which this Convention confers the right thereto, of the emblem or name of the Red Cross or Geneva Cross,"

Be it resolved, That the Executive Committee of the American National Red Cross requests that all hospitals, health departments and like institutions kindly desist from the use of the Red Cross, created for the special purpose mentioned above, and suggests that for it should be substituted some other insignia, such as a green St. Andrew's Cross on a white ground, to be named the "Hospital Cross," and used to designate all hospitals (save such as are under the Medical Departments of the Army and Navy and the authorized volunteer aid society of the Government), all health departments and like institutions, and, further,

Be it resolved, That the Executive Committee of the American National Red Cross likewise requests that all individuals or business firms and corporations who employ the Geneva Red Cross for business purposes, kindly desist from such use, gradually withdrawing its employment and substituting some other distinguishing mark.

January 6, 1908.

Editor American Journal of Public Hygiene:

Will you kindly insert the following in your Journal giving it as prominent a place as possible?

The writer desires information regarding any alleged recoveries or cures of inoperable or recurrent carcinoma of the mammary gland.

If any case or cases are known to anyone who reads this circular, and can be authenticated by facts as to the history and condition prior to recovery and the length of time which has elapsed since recovery, such information will be much appreciated and duly acknowledged.

Any well-authenticated reports of recoveries from carcinoma located in other parts than the mammary gland will be welcomed.

Cancer paste cures, X-ray cures, radium cures, or cures as result of surgical operation are not wanted.

Hearsay cases are not wanted, unless accompanied by name and address of person who may give knowledge first hand.

Address, HORACE PACKARD,
470 Commonwealth Ave., Boston, Mass.

The Hodgkins Fund Prize of $1,500 is offered by the Smithsonian Institution, Washington, D.C., in accordance with the following announcement:

SMITHSONIAN INSTITUTION

HODGKINS FUND PRIZE

In October, 1891, Thomas George Hodgkins, Esquire, of Setauket, New York, made a donation to the Smithsonian Institution, the income from a part of which was to be devoted to "the increase and diffusion of more exact knowledge in regard to the nature and properties of atmospheric air in connection with the welfare of man."

In the furtherance of the donor's wishes, the Smithsonian Institution has from time to time offered prizes, awarded medals, made grants for investigations, and issued publications.

In connection with the approaching International Congress on Tuberculosis, which will be held in Washington, September 21 to October 12, 1908, a prize of $1,500.00 is offered for the best treatise that may be submitted to that Congress "On the Relation of Atmospheric Air to Tuberculosis."

The treatise may be written in English, French, German, Spanish or Italian. They will be examined and the prize awarded by a Committee appointed by the Secretary of the Smithsonian Institution in conjunction with the officers of the International Congress on Tuberculosis.

The right is reserved to award no prize if in the judgment of the Committee no contribution is offered of sufficient merit to warrant such action.

The Smithsonian Institution reserves the right to publish the treatise to which the prize is awarded.

Further information, if desired by persons intending to become competitors, will be furnished on application.

CHARLES D. WALCOTT,
Secretary, Smithsonian Institution.

Washington, February 3, 1908.

BOOK REVIEWS

Clean Water and How to Get It. By ALLEN HAZEN, *Member American Society of Civil Engineers. John Wiley & Sons, New York,* 1907.

In the present day when men from various pursuits are called to serve their city or state in some political office, it is essential that they become familiar with the different departments with which they have to deal. Many technical books may have already been written on the subjects on which they wish to be informed, but books which treat of the practical principles and facts may be wanting. To fill such a need in the department of water supply this book, on "Clean Water and How to Get It," was written. It is for beginners, but especially for those who have power to act in a way to bring about better conditions, for those, "who wishing to serve their cities well, can perhaps be aided in doing it by very simple statements as to some matters."

In the first five chapters Mr. Hazen discusses the different sources of supply, their characters and adaptability for use, illustrating his points very clearly by brief but adequate descriptions of specific city works. In a very simple way he explains what hardness, turbidity and color are, to what due and how best they can be removed. In detail, he describes the mechanical, the slow sand, and intermittent filters, and shows why and how each is good and under what conditions each is best. Then, that the book may be complete, he mentions the various parts of water works, their size according to need for consumption, for manufacturing, for fire service, with a view, too, to the pressure required. He deals also with the means of suppression of waste, and fair charges, in connection with the cost of construction and maintenance.

The book on the whole is a comprehensive, practical view of the entire subject, giving a general idea as well as specific in some cases of meeting almost any problem in connection with securing a new supply or improving an old one. It bristles with facts presented in excellent English. From reading it one would be able to see the necessary requirements, would be able to follow intelligently the methods proposed by an expert, and understand why under particular conditions certain devices are best, in short would be made more competent to fill his position as a man interested in water works.

R. S. WESTON.

Physician's Visiting List, 1908. *P. Blakestons Son & Co., Philadelphia, Pa.*

An orderly system of keeping engagements, records of visits made, accounts and general memoranda, is an invaluable aid to the busy practitioner. Many an important item is lost if not noted at the time. The usefulness of this book is too well known to need further comment.

BOOKS AND PAMPHLETS RECEIVED.

Report — Michigan State Board of Health.

Trachoma — Its Character and Effects. By Passed Assistant Surgeons T. Clark and J. W. Schereschewsky, *Washington, D.C., Government Printing Office.*

Transactions of the Fifth Annual Conference of State and Territorial Health Officers with the U.S. Public Health and Marine Hospital Service, Washington, May 29, 1907.

Cosmetic Surgery. By Chas. C. Miller, M.D. *Published by the author,* 70 *State Street, Chicago.*

Report of the Seventh Annual Conference of Sanitary Officers of the State of New York, 1907.

Eleventh Annual Report of the North Carolina Board of Health.

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EDITORIALS

THE PRESERVATION OF FOODS BY COLD

THE commercial and scientific aspects of the preservation of foods are so intimately related that no discussion of the one seems possible without including the other. If a food, whether animal or vegetable, has no revenue-producing value when to its preparation is added the cost of its transportation and sale, its surplus supply is allowed to undergo ordinary decomposition, and in this process does often become a nuisance and even a source of expense both to its owner and the municipality in its abatement. De Loverdo, in his work on "*Conservation par le Froid des Denrées alimentaires*," says in the opening sentence:

"*Dans l'histoire des échanges des denrées alimentaires périssables, l'intervention du froid artificiel est destinée à jouer un rôle, à coup sûr, plus considerable que les applications de la vapeur*," which may be interpreted as meaning that the influence of cold in maintaining foods in their normal state is of much greater importance than the question of whether a freight vessel crossing the ocean from say America to Europe takes one week or one month on the voyage. The problem, however, of food preservation is a much larger one than the mere production of cold, since it involves equally the question of maintaining in cold chambers a proper relative humidity of the air and, so far as practicable, a condition of *asepticism*. Now, were it practicable to introduce all foods in a perfectly sterile or aseptic condition into a storage chamber, it is evident that with a proper humidity the question of cold could be largely eliminated; but it is the practical impossibility of this that makes the application of cold to the preservation of foods of incalculable sanitary and economic value.

THE PART COLD PLAYS IN FOOD PRESERVATION. The popular idea is that cold kills absolutely all vegetable life, including bacteria and fungi; but since liquid air (—190° C.) does not affect certain species, or even boiling hydrogen yet many degrees colder, as fungi grow freely on frozen meat in storage at —10° C. in a saturated atmosphere, and since lichens develop naturally on Arctic snows, it need hardly be said that other elements than mere cold enter into the problem. Yet while this is true, it is most important to realize that any temperature below 50° F. does in practice very notably retard the multiplication of the ordinary germs of fermentation and putrefaction if those other favoring conditions of normal humidity (70° to 75° of saturation) and relative cleanliness or asepticism be present. We may say, then, that to obtain the best possible conditions, a temperature between 32° and 40° F., and a clean atmosphere, having a relative humidity of 70° to 75°, are essential. As microbes, generally, require a moist or liquid medium for their growth, whether on surfaces as *aerobes*, or in deeper tissues, as *anaerobes*, it is plain that they will grow but slowly on dry surfaces or in tissues constantly drying out in the open air and sunshine, where the ever-moving wind not only renews the air, for instance, about freshly killed meat and boxes of watery fruit, but also causes, as on the western plains or the South African belt, a rapid evaporation of moisture from the tissues. Thus in the preservation of meats, such climates, with their clear, cold nights, supply the three essentials of cold, aseptic air and relative dryness. For instance, the mildest wind, a zephyr at five miles an hour, causes 25,000, and more, changes of air around any object, and with a barometer at 30 inches at sea level, which means a relative humidity of 70 to 75 per cent, we have a *norm* which we must try to reproduce at the low temperature of 32° to 40° F. in a cold chamber. Experience in cold storage has shown that microbes which will grow on frozen meat at 25° F. will not multiply even at 40° F. in clean air with a relative humidity of 70 to 75 per cent. Hence, given an initial cleanness of a food, as great as possible, and the circulation of the air around it, either by a changing of air temperature or by a fan, enabling the air surrounding the food to maintain a relative humidity of 75 per cent, and a cold storage plant is being maintained at its optimum for any temperature determined upon. It, therefore, hardly needs to be remarked that the best or even tolerable results need not be expected if the carcasses of diseased or emaciated animals, or of those badly slaughtered or killed in foul-smelling abattoirs, with dirty knives, by persons with filthy clothes and apparatus; milk even from healthy cows, but having filthy udders, taken by men with unclean hands and soiled clothing, into non-sterile, wide-mouthed pails; butter made from milk infected with various microbes, and not having the water-holding nitrogenous matters in solution well worked out; or fruits, which, though having passed through the dangers of the growing season, are either bruised or rendered filthy in picking and packing, are placed in either stationary cold chambers or refrigerator cars or vessels. The trinity of *asepticism, cold and a* *proper relative humidity*, is a sort of *e pluribus unum*, which must in scientific cold storage be our object of reverence and worship.

HOW COLD STORAGE IS OBTAINED. It is manifest, in cold climates like Canada, and many parts of the United States, that it is desirable, wherever possible, to utilize winter ice for cold storage. By it, under best conditions, a temperature about 40° F. may be maintained; but only under the most favorable circumstances and very constant care. Ordinarily, however, owing to a lack of ventilation, or of means for maintaining a proper relative humidity, the advantages of cold from ice are largely lost. Manifestly it is essential that a nearly constant temperature be maintained in the cold chamber, and that the circulation of air within it be regular and definite. Any temperature between 32° and 40° F. seems almost equally good for preserving meat, but not any range of temperature between these two points. How delicate is the matter of relative humidity and of air saturation at low temperatures is learned from the small amount of water vapor which one cubic foot of water at 32 degrees F. will hold.

TABLE OF RELATIVE HUMIDITIES.

Temperature in Degrees Fahrenheit	Grains of Water in 1 Cubic Foot of Air	Temperature in Degrees Fahrenheit	Grains of Water in 1 Cubic Foot of Air
0° F.	.545 grains	60° F.	5.75 grains
10° F.	.841 "	70° F.	7.99 "
20° F.	1.229 "	80° F.	10.94 "
30° F.	1.96 "	90° F.	14.14 "
40° F.	2.86 "	100° F.	19.19 "
50° F.	4.05 "		

Thus, if one cubic foot of air at 40° F. having a relative humidity of 75 per cent holds 1.47 grains of moisture, then a fall of 4° F. means that saturation point has been reached, so that an optimum means that at any temperature between 32° and 40° F. no greater range than 2° is allowable. Remembering how radiation from external walls takes place, how the specific heat (0.8° F. average) of foods put in cold storage keeps raising the temperature of the chamber, and how this loss of heat of the food by conduction, radiation and evaporation tends to a saturation of the air, and therefore of condensation on its surface, it is not surprising that ice has, in a large measure, failed as a satisfactory source of cold for large storages at low temperatures.

It would appear from experiments that at least two feet in thickness of six layers of tongue and grooved boards and waterproof paper, with three hollow spaces, one filled with packed shavings of at least one foot in thickness, has proved the best practical material for constructing non-conducting walls; and that when this is thoroughly well constructed with a rapid cooling for some hours by air currents of butter, cheese, meat, etc., in an anteroom, prior to placing such in cold storage, a practical value may be given to the use of ice. The need of this cooling prior to storage is gathered from the following table:

TABLE OF SPECIFIC HEAT OF SOME FOODS.

	Water	Solids	Specific Heat Above Freezing	Latent Heat of Freezing
Lean Meat	72%	28%	0.77	102
Fat Meat	51%	49%	0.60	72
Veal	63%	37%	0.70	90
Fat Pork	39%	61%	0.51	55
Eggs	70%	30%	0.76	100
Potato	74%	26%	0.80	105
Cabbage	91%	9%	0.93	129
Cream	59%	30%	0.68	84
Chicken	73.7%	26%.	0.80	—

The necessity of this preliminary cooling is especially seen in large carcasses, since if, as the common case in packing houses, meats are subjected for through and through chilling to temperatures 10° or 15° F. below freezing, freezing of wet outer tissues would take place before the interior had been well chilled and internal anaerobic putrefactive changes might take place though surrounded by an outer casing of frozen tissues. But rapid preliminary cooling plays a yet greater part in this problem of preservation of foods. In the case of milk it is the *sine qua non*, and no subsequent care can make up for delay for even an hour in the chilling of milk to below 50° F. When rapidly chilled in clean air over ice-water pipes from 100° F. to 40° F., and then stored in sterilized bottles in cold ice storage, milk has been shown quite capable of retaining the same normal acid reaction for a whole week. As Loverdo points out, the small, watery fruits with the summer heat in them will deteriorate in a night if not rapidly chilled, which as well prevents the moisture so rapidly given off by them from causing surface condensation, and the growth of penecillum, aspergillus, etc. That this can only be attained by chilling prior to shipping in iced cars, and should be invariably carried out, has been proven by experiment and practical experience in damaged fruit, both in Europe and on this continent. Its solution has been found in the Southern States by running the fruit cars into chilling galleries with temperatures 10° to 15° below freezing, and in France by refrigerator cars fitted up with ammonia compressor refrigerating machines. Much delicacy in manipulation is in practice necessary to obtain the best results, since should fruits be subjected to a (— C.) temperature too long after losing their specific heat they would be injured by freezing. The statical condition thus established before any microbic growth has been possible, or any tissue changes have taken place, enables all foods to be thereafter handled with a degree of success, even at higher temperatures, unattainable in any other way; but the same intelligent knowledge of the phenomena of air physics and the conditions favoring or retarding microbic growth is necessary to maintain the highest results. Thus, the condensation of air moisture which meat at 40° F. will cause when it is brought into a higher temperature results in a slimy surface to the meat, and forms a medium for rapid microbic growth, unless during this rising temperature the meat is kept in a free current of air.

P. H. BRYCE.

FEDERAL SUPERVISION OF BIOLOGIC THERAPEUTIC PRODUCTS

In Germany, which may be taken as a type of a paternal government, traffic in antitoxic serums is controlled by the Kgl. Institut für experimentelle Therapie, Frankfurt a. M., which is designated as the official place where, under Ehrlich's direction, all the official testing is done. Apothecaries are allowed to deal only in serums which are thus controlled. This control begins at the place of manufacture and ends with the bottling of the tested serum. The bottling is done under the supervision of a government officer known as the "Abnahmbeamte." The serum is tested for both potency and purity. Each lot, when bottled and sealed by the government officer, receives the stamp of approval of responsible authority.

This system of supervision is not possible with our dual form of government. Our Federal government can only control the manufacture and sale of biologic products when the State line is crossed; that is, a State has complete and final control over such matters so long as the antitoxin or vaccine is made and sold within the State's confines. For example, the efficient State Board of Health of Massachusetts manufactures vaccine virus and diphtheria antitoxin for use in the State of Massachusetts, and the Act of July 1, 1902, entitled "An Act to regulate the sale of viruses, serums, toxins, and analogous products in the District of Columbia, to regulate interstate traffic in said articles, and for other purposes," therefore takes no cognizance of the production and distribution of these biologic products in Massachusetts so long as the traffic is confined to that State. All persons who engage in *interstate* traffic in diphtheria antitoxin, tetanus antitoxin or other antitoxic serums, vaccine virus, tuberculins, bacterial vaccines and similar preparations must first obtain a license from the Secretary of the Treasury through the Public Health and Marine Hospital Service to engage in this business. This license is obtained only after a thorough inspection of the laboratory and stables to insure sufficient equipment and competent *personnel* to produce safe and reliable products. All foreign manufacturers who exploit biological products in America must submit to similar inspections and obtain a similar license. The licenses are good for one year only, when the plant must be reinspected. In the meantime the products are bought on the open market and examined for purity and potency in the Hygienic Laboratory of the Public Health and Marine Hospital Service. In this way a satisfactory supervision has been maintained over biologic products in this country.

The law has been administered without fear or favor. Manufacturers have been required to expend many thousands of dollars to improve their plants in order to obtain a license in the first place, and also to use every known safeguard to protect their vaccines and antitoxins from impurities.

Perhaps the most notable effect is seen in the great change which took place in vaccine virus. Before the operation of the law the commercial vaccine virus sold in our country frequently contained bacterial impurities of a more or less serious nature; it was not unusual to find a vaccine point contaminated with many thousands of bacteria, some of them streptococci and other virulent pathogens.

Willson and McFarland* reported an epidemic of tetanus in this country in 1902 which was probably due to tetanus spores in vaccine virus. It will be remembered by many that sore arms were all too frequent as a result of vaccination before the operation of the law. The annual reports of Surgeon-General Walter Wyman show that, as a result of the examinations made, vaccine virus sold upon the open market is now reasonably clean, containing very few bacteria and these of a harmless nature. These laboratory results are confirmed by reports of health officers, who are almost unanimous in confirming the statement that they now see few if any sore arms or any other untoward complications resulting from vaccination that may be attributed to impurities in the virus.

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* Journ. Am. Med. Assn., Vol. XXXVIII, 1902, p. 1147; Journ. Med. Research, n. s. Vol. II, 1902, p. 474.

The unit for measuring the strength of diphtheria antitoxin is based upon that established by Ehrlich and is distributed to the licensed manufacturers. So far as the antidiphtheric serum is concerned the good effects of the law are seen in uniformity and increased potency. Before the passage of the Act there were some very weak antitoxins upon the market; now there is none having a strength of less than 250 units per cubic centimeter. Through improved methods of refinement and concentration, serums may now be obtained containing more than 1,000 units per cubic centimeter. The serums of European manufacture are decidedly weaker as compared with the American products.

The sad experience in St. Louis in 1902, reported by Bolton and Fisch,* was said to be due to the presence of tetanus toxin in the diphtheria antitoxin. Under the operations of the law every known safeguard is now utilized to prevent similar accidents, and fortunately none has since occurred.

The standardization of tetanus antitoxin has proved a difficult and it seemed for many years a hopeless task. The problem has, however, been satisfactorily solved in a practical method evolved in the Hygienic Laboratory in Washington. There are now four methods used in the standardization of tetanus antitoxin: (1) The German method according to von Behring, (2) the French method used by Roux, (3) the Italian method based upon the work of Tizzoni and Cattani, and (4) the American method. The European methods are admitted to be cumbersome and not very accurate. The American method commends itself for simplicity and precision. A stable tetanus toxin has been found* which is issued to licensed manufacturers and others interested. The potency of an unknown serum may be tested directly against the test dose of this standard official toxin.

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*Trans. Assn. Amer. Physicians, 1902, p. 463.

The work upon tetanus antitoxin has revealed the fact that the serums sold upon the open market varied extravagantly in the unit value claimed for them, and, for the most part, they had very feeble antitoxic strength. For instance, serums claimed to contain 6,000,000 units per cubic centimeter actually had but a trifling amount of antitoxic power. The antitetanic serums now on the market in the United States all have comparable strengths and sufficient potency for therapeutic use. It is noteworthy that the foreign serums are much weaker than the American serums. For instance, antitetanic serums made by the Pasteur Institute contain only about forty American units per cubic centimeter.

There is no satisfactory method of standardizing certain biologic products, such as tuberculin, antipneumococcic serum, etc. These products are, therefore, only tested for purity and freedom from contamination.

One of the gravest dangers with which manufacturers and purveyors of biologic products have to contend is the tetanus spore. In a notable article, Theobald Smith † has again called attention to some neglected facts in the biology of the tetanus bacillus. Smith shows that tetanus spores may survive a single boiling or steaming for twenty minutes regularly, usually for forty minutes, and occasionally for sixty minutes;

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* The Standardization of Tetanus Antitoxin; an American unit established under authority of the Act of July 1, 1902. By M. J. Rosenau and John F. Anderson. Bull. 44, Hyg. Lab., U.S. Pub. Health & Mar.-Hosp. Serv., Washington, 1908.

† Journ. Am. Med. Assn., Vol. L, March 21, 1908, p. 929.

in one case seventy minutes' exposure did not destroy all the spores. He also brought out the remarkable fact that culture fluids sterilized by continuous boiling or steaming in routine laboratory work, even when a relatively small amount of fluid is exposed to strong steam for twenty minutes on three successive days, is not sufficient to kill tetanus spores. Accidents with tetanus have been only too frequent. We may here refer to several outbreaks of tetanus which occurred some years ago, one in this country and one in Europe, as a result of the use of antitoxin; further, to the nineteen deaths from tetanus caused by injecting persons in Mulkowal, India, with Haffkine's plague prophylactic.

From the beginning of the government supervision of biologic products particular attention has been given to the danger from tetanus spores or tetanus toxin; in several instances licenses have been refused to manufacturers of vaccine virus on account of the proximity to horse stables. The government has insisted upon the use of the autoclave, which Smith now proves is necessary surely to kill tetanus spores. Finally, all biologic products must be tested upon susceptible animals, such as mice and guinea pigs, in order to insure the absence of tetanus before they are placed upon the market.

While the government exercises a close, constant and rigid supervision over the manufacture and interstate sale of biologic products, it does not guarantee each individual package. It holds the manufacturer responsible for the potency and purity of his products and endeavors, by inspections and laboratory examinations, to cause the manufacturer to maintain that high degree of technical excellence and conscientious and intelligent care in the preparation of these products that have proved a sufficient and reasonable safeguard.

M. J. ROSENAU.

SOME FACTORS IN THE SPREAD OF TYPHOID FEVER

Probably no disease has been more studied and more discussed than typhoid fever; yet our death rates still remain a discredit to American sanitation. Typhoid causes, year after year, in many of the most prosperous States of the Union a loss of thirty deaths per hundred thousand, three times the rate which prevails in European communities. Some of our cities which continue to drink grossly polluted water offer still more monumental examples of criminal sanitary negligence, with rates of fifty and seventy-five and a hundred.

In order to meet the typhoid problem as it is met in other countries, it is necessary to grasp it in all its aspects. We give attention to water supply at one time; we spasmodically attack the milk supply at another. Practically no community has as yet carried out a thoroughgoing and systematic campaign against typhoid fever of all sorts and from all sources.

An intelligent control of typhoid necessitates regard to three distinct factors in the spread of the disease. The prevalence of this, as of other contagious maladies, requires, first, the presence of the infective agent; second, a suitable channel for transmitting the germ to the susceptible patient; and finally, such a condition of vital resistance on the part of the patient as will permit the entrance and development of the invader. Most sanitary authorities in this country have directed their attention toward the second link in the chain, — the vehicles of disease, by which the germ passes from the sick person to the susceptible victim. Even here, however, some important factors have been strangely neglected.

Typhoid bacilli come only from infected persons. Those who exhibit active symptoms might easily be cared for; but they are not. In Germany physicians and sanitary officials enforce rigid and thorough disinfection of all excreta. Here it is too often the case that physicians are careless, and that cases of typhoid do not even come to the attention of the local officials. The first essential in the campaign is then to secure prompt reporting of cases and complete and thorough disinfection of all excreta. Furthermore, those who have been cured of typhoid may sometimes carry the bacilli in their urine for months and even years, and it should be made a part of the routine control of the disease to see that no patient is discharged from treatment until this source of danger is removed. When all is done, we shall still run a certain amount of risk from a third class of bacilli breeders, the incipient cases, some of which may be prevented by high vital resistance from ever developing into recognized cases. These are the "walking typhoids"; and in extreme instances we find bacilli carriers, like the cook now under detention by the Board of Health of the City of New York, who has apparently never suffered from the disease, but has caused half a dozen well-marked epidemics and carries typhoid bacilli habitually in her intestine. It is, of course, impossible to detect all such cases as this; and as long as they exist, supervision of the vehicles by which infection may be carried to well persons must never be relaxed. At the same time our excessive American typhoid will never be diminished unless the stream of infection is checked at the source in all cases where this can possibly be done.

Among the vehicles, or channels, by which typhoid passes from the infected person to the well person, water supply has attracted widest attention. This has justly been the case, since no other vehicle furnishes so good an opportunity for the transmission of typhoid fever to great numbers of persons at the same time. The most striking epidemics of the past have been due to water, and the extreme death rates which still disgrace a few American cities are even now due to this cause.

Water-borne typhoid is, however, being steadily eliminated in most cities and in many States, and now accounts for only a small proportion of the total deaths from this disease. We are turning, and rightly, toward milk as a second important cause; and as long as milk is handled by a number of more or less uncleanly men and women and drunk without cooking, so long unrecognized cases of typhoid fever among milk handlers will cause epidemics. Here, as in the case of water supply, we must protect our original sources as far as possible by careful inspection as to cleanliness; and then if we are wise we shall purify the final product, — by filtration in the case of water, by pasteurization in the case of milk. Beyond these two vehicles of typhoid fever there are others to which as yet we have paid little attention. In the States where sanitary progress has been most marked, epidemics of typhoid due to water and milk combined make up a small proportion of the whole. The rest is what has been called prosodemic typhoid; that which spreads through or among the people by various channels, never reaching a large number at the same time, but passing from point to point by devious and various paths. "Food, fingers and flies," offers an illiterative explanation of much of this prosodemic typhoid. Flies no doubt cause many cases by passing from infected vaults to unprotected food. Direct contact is responsible for many more, as is shown by the cases of typhoid fever which occur even among trained nurses. How much more numerous these are among untrained attendants, only those who have studied epidemics know. The old dogma that typhoid is infectious but not contagious has slain its thousands and tens of thousands. Typhoid fever under uncleanly conditions is essentially a contagious disease; and so long as it is not treated as such, contact infection will play its subtle and destructive part. At the bottom of all these methods of transmitting prosodemic typhoid lies the great factor of pathogenic filth. "Infected excreta getting into the mouth" is the fundamental process; and the residual typhoid due to such causes can only be met by a cleanly disposal of waste materials and by the general protection of food from pollution.

Finally there remains another factor in the transmission of typhoid, a factor almost wholly neglected, yet of much importance, the vital resistance of the patient. In every disease the infecting germ must be aided by some weakness in the defending garrison of body cells. In some of them the germ is so strong and the body relatively so weak that infection is almost always followed by the development of the disease. Such a case is found in bubonic plague. At the other extreme stand such maladies as pneumonia, where the germ is widespread and weak and the vital resistance of the patient plays a predominant part. Typhoid fever occupies an intermediate position. We know that not all who are infected develop the disease, but we know almost nothing as yet of the special factors which promote or diminish the protective powers of the body. One factor at least, however, is important, and that is temperature. The regular seasonal curve of typhoid, rising slowly to a maximum in October, is one of the most familiar phenomena of this disease. "Fall fever," it was called by Dr. Elisha Bartlett in the old days. Where heavily polluted water causes epidemics in the autumn and spring this regularity is broken, but in other cases the normal typhoid curve is a direct function of the temperature. A part of the autumn maximum may be due to the special opportunities for infection which beset vacations under unsanitary surroundings, and the excessive prevalence of flies at this season doubtless plays its part. The phenomenon is however far too general to be accounted for by local factors. It used to be thought that the relation was mainly due to a favorable effect of warmth upon the germs in the environment, more surviving in hot weather than in cold. Recent studies have indicated, however, that temperature may perhaps act directly on the patient too. In a careful investigation of typhoid fever at Washington, it appeared that the summer rise reached its maximum, after a short period of extreme hot weather, much more rapidly than could be accounted for by any gradual increase in the proportion of germs in the environment. Recently studies of typhoid in India have shown that the maximum prevalence among the white troops is in the hot season as with us, while among the natives the maximum occurs during the cold and rainy months. This seems conclusive proof that the organism of the host is affected by abnormal and inclement seasons. We do not yet know enough of the qualities that make for vital resistance to be able to control them in diminishing typhoid fever; but the relation of the disease to temperature furnishes a useful pointer for research. Improper feeding, abnormal physical exercise and other hygienic factors which accentuate the effects of hot weather may play their part as predisposing causes. If physicians, with the opportunity of observing epidemics in detail, can throw light upon these contributory causes, we may have a new arsenal of weapons for the campaign.

The effect of high temperature in favoring the attack of the typhoid invader helps to explain some of the most notable facts in the geographical distribution of the disease. A direct effect upon the vital resistance of the host makes comprehensible that regular increase in the prevalence of typhoid fever which is noticed as we pass southward along the Atlantic seaboard. Summer heat may offer one reason for the prevalence of this disease in the United States as a whole, in comparison with parts of Europe which show a more even climate. Most of our excess of residual typhoid, however, could be prevented by intelligent and efficient health administration. Ten thousand lives a year may be saved by the sanitary authorities of the United States when they awake to their obligations in regard to the disinfection of infected excreta; the cleanly disposal of waste materials in general; and the protection of water, milk and other food supplies from filth.

C.-E. A. WINSLOW.

SPECIAL ARTICLES

NOTES ON THE USE OF SMITH SOLUTION AND BILE MEDIA *

By L. V. PARKER
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In the spring of 1907 the question of the relative efficiency of Smith and bile media, used as a purely presumptive test in the detection of *B. coli*, was brought up by the engineer in charge of the investigation of the water purification plants of the State of Ohio. A preliminary study of the relative value of the two media at Youngstown indicated that the bile was a more delicate and reliable test. In order to ascertain whether this would hold true in other cases, the laboratory procedure in carrying out *B. coli* determinations was modified so as to include bile media. The general procedure in carrying on these studies was to run parallel examinations on all samples, using both Smith and bile media for a preliminary growth and carrying these samples through a series of confirmatory tests.

MEDIA USED. Fresh ox bile was used which was first sterilized in the autoclave at about eight pounds pressure. After this preliminary sterilization, one and one-half per cent of lactose was added. The media was tubed and sterilized in streaming steam on three successive days. Other media was prepared in accordance with the "Standard Methods" recommended by the Laboratory Section of the American Public Health Association, except that in the case of the

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* Received for publication March, 1908.

50 and 100 c.c. portion mentioned in the paper, a dextrose broth containing sufficient phenol to give a final dilution of .025 per cent was used for enrichment.

The procedure recommended by the Committee on Standard Methods of the Laboratory Section of the American Public Health Association was used, except that in some cases the tests for motility and morphology were omitted. The complete procedure was carried out on two hundred samples and the following results were obtained. The total number of samples giving positive *B. coli* findings, using results from both media, were: in the 1 c.c. portion, 109; in the 50 c.c. portion, 86; in the 100 c.c. portion, 82.

SUMMARY OF RESULTS FROM THE EXAMINATION OF TWO HUNDRED SAMPLES

	Smith						Bile					
	Presumptive			Confirmatory			Presumptive			Confirmatory		
C.c. of sample	1	50	100	1	50	100	1	50	100	1	50	100
Positive findings . . .	108	94	84	81	82	66	116	88	82	105	84	79
Percentage confirmed .	....	....	....	75	87	79	....	....	....	91	95	96

When the results shown in the table are compared, it will be seen that the bile, used as a purely presumptive test, is much more satisfactory than the dextrose broth. And if the further comparison is made, using the positive findings from both media, as given in the figures preceding the table, the efficiency of the bile used as a presumptive test, compared with the complete procedure, is very high.

HIGH AND LOW COUNTS. In order that the influence of high and low counts on the *B. coli* findings might be ascertained, a certain number of such results were tabulated. The counts were made on 1½ per cent agar plates, incubated at room temperature for either two or three days, depending upon the season. The results are as follows:

SUMMARY OF RESULTS FROM TWENTY-FIVE SAMPLES GIVING A COUNT ABOVE FIVE THOUSAND

	Smith						Bile					
	Presumptive			Confirmatory			Presumptive			Confirmatory		
C.c. of sample	1	50	100	1	50	100	1	50	100	1	50	100
Positive findings . . .	17	15	7	8	11	5	13	13	6	9	10	6
Percentage confirmed .	....	....	....	47	73	71	....	....	....	69	77	100

Using the results obtained from both media, 9 positive final findings were obtained in 1 c.c., 11 in 50 c.c., and 8 in 100 c.c.

SUMMARY OF RESULTS FROM TWENTY-FIVE SAMPLES GIVING A COUNT BELOW THREE HUNDRED

	Smith						Bile					
	Presumptive			Confirmatory			Presumptive			Confirmatory		
C.c. of sample	1	50	100	1	50	100	1	50	100	1	50	100
Positive findings . . .	8	4	19	2	2	8	4	2	11	3	2	9
Percentage confirmed .	....	....	....	25	50	42	....	....	....	75	100	82

Using the results obtained from both media, 4 samples gave a final positive finding in 1 c.c., 2 in 50 c.c., and 10 in 100 c.c.

The summary of the samples giving counts above 5,000 indicates that in both media gas formation may be noted and subsequent tests prove the absence of *coli*. The relative efficiency of the bile medium, however, appears higher in this direction, while, on the other hand, very few really positive findings are lost. The results obtained in the case of low counts are very similar to those shown by the counts above 5,000 per c.c., except that an even higher efficiency is shown for the bile medium.

GENERAL SUMMARY. During the time covered by the investigation, 704 samples from various sources were examined. The complete procedure was carried out on 200 of these with the results previously mentioned.

Of the other 504 samples, none gave 25 per cent gas in the bile tube, 66 gave gas in the Smith tube and all of them failed to give characteristic red colonies on the lactose azolitmin agar plate or were negative in a majority of the subsequent tests. Therefore, while the comparative efficiency of the two media in detecting true positive cases is well indicated, the relative efficiency of the bile in cutting out negative cases is apparently much underrated.

The foregoing data was obtained from a review of the notes of the routine work of the laboratory. The results indicate a much higher efficiency for the bile media than for the Smith solution and, also, that presumptive tests with bile media are, compared with the routine method practised in this laboratory, remarkably efficient.

The limited scope of the experiments prevents the giving of more definite statements.

American Public Health Association

LABORATORY SECTION

A METHOD FOR CALCULATING THE NUMBERS OF B. COLI FROM THE RESULTS OF DILUTION TESTS*

By EARLE B. PHELPS, S.B.
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Two general methods are available for the preliminary isolation of *B. coli*. The sample may be plated out on a lactose litmus medium and the red colonies counted and fished; or a series of dilutions may be made in a liquid sugar medium, the resulting production or non-production of gas noted, and suitable plates made from the highest dilution giving a positive test. The plate method has the advantage of simple manipulation and of yielding quantitative results. The dilution method, on the other hand, possesses the greater sensitiveness associated with liquid media, but, unless a very large number of dilutions be made, its results are only roughly quantitative. Such results are not suitable for the direct calculation of averages in routine work, nor can they be used directly in purification studies for the determination of "per cent removed."

The nearest approach to any quantitative statement is the one frequently used under such a heading as "per cent of positive tests in 1 c.c."; that is, it is tacitly assumed that, if 25 per cent of the 1 c.c. samples give positive tests, the

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[*] Read before the Laboratory Section, American Public Health Association, at Atlantic City, Sept. 30, 1907.

organism is present once in every 4 cubic centimeters. The mathematics of this reasoning is strictly correct only if the water in question contains absolutely the same numbers day after day, and the results obtained vary from the actual facts more and more the greater the daily fluctuation in numbers. The truth of this statement will become apparent if a hypothetical case be worked out.

With waters that vary greatly from day to day in their *B. coli* content, or with sewages and sewage effluents, a more accurate procedure consists in making such a series of dilution on each sample that both positive and negative tests will be obtained. For example, with a sewage effluent containing, let us say, 1,000 *B. coli* per c.c., dilutions of .01, .001 and .0001 c.c. would generally give two positive and one negative test, although the middle dilution might by chance be negative. There is also one chance in ten of the highest dilution giving a positive test. The actual chance of a negative test on the middle dilution could be determined mathematically by Maxwell's distribution law, but in a case of this kind the chance of an even distribution of the bacteria is sufficiently great to be considered unity for practical purposes.

It is the purpose of the present paper to show that from a series of results obtained in this way, on a water whose bacterial content is varying from day to day, a fairly accurate statement of the average numbers present can be calculated. The accuracy of the result will depend largely upon the number of observations averaged and to a lesser degree upon the uniformity in the actual numbers present from day to day.

The principle upon which this method of calculation is based is this: If a series of dilutions are made from a given water and these dilutions submitted to appropriate tests giving positive or negative results, the most probable value of the actual numbers of organisms present is indicated by the reciprocal of the greatest dilution giving a positive test. For example, if dilutions of 0.1, .01 and .001 c.c. are investigated and a positive result obtained on the first two and not on the last, the most probable number of bacteria present in the water is 100. From this one test alone it might be inferred that such was not the case. It would ordinarily be stated that the number present was over 100 and under 1,000, with a probable value, perhaps, of 550. Such a statement would overlook the possibility of its being but 50, a one to one chance, or but 10, a one in ten chance. However, the accuracy of any statement based upon this one test would be but slight. Suppose now we have ten such tests with identical results. The ten .001 c.c. portions make one .01 c.c., so we have ten .01 c.c. tests positive and one negative. This practically eliminates the possibility of there being over 100 organisms present per cubic centimeter. If there were more than 100 present the chance of its being absent in .01 c.c. would be very slight, while it would have been found once at least in ten .001 c.c. portion. On the other hand, if samples present were far below 100, consistent positive tests would not have been obtained in .01 c.c.

If, therefore, we write down the reciprocal of the highest dilution giving a positive test as the number of organisms present in a given sample, we shall have selected the most probable value. This merely means that in any single test the value taken may be widely in error, but that the average of 50 or 100 tests will not be far from the truth.

The truth of these statements may best be shown by an example.

Let us assume that during one hundred days a sewage filter effluent was under examination, samples being taken daily and tested in dilution of from .1 to .00001 c.c. We will further assume that on certain ten of these days there were 10 *B. coli* present, on ten other days, 50, and so forth up to 90,000, as shown in the accompanying table. The table then shows how many positive tests would be obtained at each dilution out of each set of ten made on a sample of a given kind.

B. Coli Actually Present on Each of Ten Days	Number of Positive Tests at Each Dilution Out of a Set of Ten Daily Tests				
	0.1	0.01	0.001	0.0001	0.00001
10	10	1	0	0	0
50	10	5	0	0	0
90	10	9	0	0	0
400	10	10	4	0	0
800	10	10	8	0	0
1,200	10	10	10	1	0
2,000	10	10	10	2	0
9,000	10	10	10	9	0
50,000	10	10	10	10	5
90,000	10	10	10	10	9
153,550	100	85	62	32	14
	15	23	30	18	14

Adding up the columns, we get the total number of positive tests at each dilution and also the number of *B. coli* which, divided by 10, gives the average number for the 100 days. This average is seen to be 15,000 in round numbers. Subtracting the total positive tests at each dilution from the total at the next lower dilution gives the number of times that each test was the highest positive dilution in its set. We see that the 0.1 c.c. was the highest dilution giving the test 15 times, .01 c.c., 23 times, etc. Multiplying these numbers by the reciprocal of the dilution, adding and dividing by the total number of tests, 100, we get the average number 16,000 against the true average, 15,000, thus:

$$\begin{array}{r} 150 \\ 2{,}300 \\ 30{,}000 \\ 180{,}000 \\ 1{,}400{,}000 \\ \hline 1{,}612{,}450 \div 100 = 16{,}000 \end{array}$$

An unusually wide range of values has been taken to show that the method of treatment proposed will give accurate results even under such severe conditions. Obviously the lower numbers have little effect upon the average. With more uniform figures accurate results are obtained with fewer tests. Thus taking the 50 days with the lower values, 10 to 800, we find the actual average to be 270, calculated 290. Similarly, for the remaining 50 days, the actual average is 30,000, calculated 32,000.

The method is obviously of no value for single tests and finds its most useful application in routine studies in water and sewage purification when it is desirable to determine average numbers over a month or a year in order to calculate the efficiency of the process.

To avoid the use of long decimal numbers for dilution, we may use the logarithm of their reciprocals. Thus a dilution of 0.1 would be 1; 0.01, 2; 0.001, 3, etc. These numbers have an additional meaning. They show the number of zeros to be added to 1, or to any plate count, to get the actual numbers. Thus, for a test positive in dilution 2 and negative dilution 3, we write 100; or, if it were positive in dilution 3, 1,000. Similarly for a plate count, if we get 85 colonies on a plate marked 2, we write 8,500, or, if the number was 3, 85,000. Furthermore, in making the dilution originally, the use of these numbers greatly reduced the chance of error. Each dilution of 1 to 10 increases the factor by 1; from 1 to 100, by 2.

With the use of these dilution factors the operation of the rule which has here been described is very simple. For each daily test we write down 1, followed by as many zeros as are indicated by the dilution factor of the highest positive test. These numbers do not necessarily show the actual number present in the sample tested, but monthly averages made from them are fully as accurate as any other bacterial count. The only precaution to be observed is that in each test the range of dilution shall be so great that at least one positive and one negative test shall be obtained.

NORMAL WATERS OF ILLINOIS*

By EDWARD BARTOW

The State of Illinois, extending, as it does, three hundred and seventy-eight miles from north to south and two hundred and seven miles from east to west, presents a varied geological character. There is a dip in the geological strata from north to south, and glacial drift covers more than two-thirds of the State. These features influence the character of the water, causing great variations.

In determining the normal waters, the following divisions, suggested by Professor A. W. Palmer, may be made:

1. Surface waters, including rivers, lakes and ponds.
2. Springs.
3. Shallow wells.
4. Deep wells in drift.
5. Deep wells in rock.

Observations of the municipal water supplies show the distribution of these classes of water throughout the State. These are indicated on the map. Deep rock wells are used most commonly for water supplies in the portion of the State north of a line drawn from Quincy to Chicago. The deep drift wells are used most commonly in the territory bounded on the north by the above-mentioned line, and on the south by a line drawn from Danville to the Mississippi River, just below St. Louis. South of the second line the great majority of the cities obtain their water supplies from rivers or reservoirs.

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* Abstract of paper read before the Laboratory Section, American Public Health Association, at Atlantic City, Sept. 30, 1907.

A study of the mineral content of the deep rock wells shows that the amount of mineral matter in the water increases from north to south, reaching its maximum in the wells along the line drawn from Quincy to Chicago. South of this line the deep rock wells, reaching down into the St. Peter's and Potsdam sandstone, contain so much mineral matter that they are useless as sources of water supply. A few of the deep rock wells to the south in other strata furnish satisfactory water. The variation in the usual sanitary chemical data obtained by analyzing these deep rock well waters is so great that the normals can be determined only by careful study of waters from many wells, and by classification according to the strata from which the waters come.

The variations are nicely illustrated in the table of analyses of water from deep rock wells. The table shows analyses of water from three wells in the northern portion of the State, and of one good water (Belleville), and one water with high mineral content (Lawrenceville) from the southern portion of the State.

ANALYSES OF WATER FROM WELLS OVER FIVE HUNDRED FEET DEEP IN ROCK

Laboratory No.	13785	15603	15753	15687	15503
Town	Elgin	Marseilles	Streator	Belleville	Lawrenceville
County	Kane	La Salle	La Salle	St. Clair	Lawrence
Depth	2,000 ft.	600 ft.	1,115 ft.	1,500 ft.	1,710 ft.
Turbidity	20.	Clear	Very slight	Clear	Very decided
Color	1.0	.2	0	.2	Brown
Odor	0	0	0	0	Kerosene
Residue on evaporation	376.	464.	2,415.	401.	29,108.
Chlorine	3.5	61.	1,000.	16.	17,400.
Consumed oxygen	4.0	2.25	8.45	1.75	46.3
Nitrogen as free ammonia	1.08	.080	1.280	.008	3.44
Nitrogen as albuminoid ammonia	.192	.032	.016	.048	.056
Nitrogen as nitrites	.000	.004	.250	.008	.000
Nitrogen as nitrates	.24	.400	.070	.752	.280
Alkalinity	323.	297.	273.2	297.	407.9
Bacteria per c.c.	0	0	95.	50+.	730.
Colon bacillus in 1 c.c.	Absent	Absent	Absent	Absent	....

Wells in the drift are also variable. This is especially noticeable with respect to oxygen consumed, and free or saline ammonia. The excessive free ammonia in these drift wells cannot indicate recent pollution, as it is not accompanied by an excessive number of bacteria nor by the colon bacillus. The waters from the glacial drift usually become turbid on exposure to the air, and should be aerated or otherwise treated before they are allowed to enter the mains. An investigation of their properties becomes, therefore, a study of their inorganic content. According to their inorganic content, these drift waters, and the other waters also, can be divided into two classes, as there is, or is not, more than enough sodium present to combine with all the nitrate, chlorine and sulphate ions. Those containing an excess of sodium ions may be successfully treated with lime. Those which do not contain an excess of sodium can be more satisfactorily treated by the addition of sodium carbonate or hydrate with the lime.

The streams which are practically all sulphate waters are now normally impure, and should at least be filtered before being used for water supplies. An investigation of their properties becomes also a study of their inorganic content, together with the suspended matter. Examinations of Illinois rivers at twenty-seven stations show a higher turbidity in the rivers to the south. The Kankakee River, rising in swamps in northern Indiana, is least turbid, but has the highest sulphates. The chlorine in all cases varies somewhat with the season, but the general averages do not differ materially.

To summarize, in deep rock wells we find great variation in mineral content. In the northern part of the State, where most of them are found, this mineral content increases from north to south. The deep drift waters are so variable that the usual sanitary tests for free ammonia and consumed oxygen have little value. The streams are all more or less turbid, the turbidity being more persistent to the south, and all the streams must be treated by filtration or sedimentation before they can be used for drinking purposes.

Finally, from the data now at hand, the conclusion must be drawn, that not only no general normal can be established for the State, but also that no general normal can be established for each class of waters.

THE ANTISEPTIC AND GERMICIDAL PROPERTIES OF SOLUTIONS OF FORMALDEHYDE AND THEIR ACTION UPON TOXINS *

By JOHN F. ANDERSON

From Hygienic Laboratory, Public Health and Marine-Hospital Service

Since the discovery by Loew and Fischer, in 1886, of the germicidal action of formic aldehyde a large amount of work has been done with the substance both as a gas evolved by various means and in the watery solution.

The recent work by McClintic seems to have established its limitations when used as a gas. The great variation in the results of various workers in regard to its action as a germicide and antiseptic in its watery solution has led me to try to determine its real value. The need of an efficient and, at the same time, a safe and comparatively cheap disinfectant is great, especially for the disinfection of the excreta of persons sick with infectious diseases. For this purpose the agent should be rapid in its action, an efficient deodorant, comparatively cheap and safe to handle. Formic aldehyde in solution, in my opinion, comes nearer to fulfilling these conditions than any other agent we have at the present time.

In the minds of the laity a deodorant is more or less synonymous with a germicide, but, of course, a deodorant may be almost valueless as a disinfectant, and, on the other

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* Abstract of paper read before the Laboratory Section, American Public Health Association, at Atlantic City, September 30, 1907.

hand, a disinfectant may possess but slight deodorizing properties. In the use of an agent for the disinfection of excreta, etc., it is important that the person using it understands just what is meant when told to disinfect the discharge with a five per cent solution. It may be understood that a five per cent solution of the agent is to be added to the discharge, while what is really meant is that the agent shall be in the proportion of 5 parts in 100 of the total volume under treatment. Of course it is needless to say that there must be a thorough mixture of the agent and of the material to be disinfected, and that they must remain in contact a sufficient length of time for the maximum action of the germicide to be exerted. While, for example, a 2 per cent solution might kill typhoid bacilli in 30 minutes, it might take a 1 per cent solution an hour or longer.

A number of samples of different solutions of formic aldehyde were analyzed to determine the exact percentage of the aldehyde contained therein, and quite a variation in the percentage was noted. The highest was 52 per cent, which was in a sample sent by a manufacturer, but it soon decreased to 43; the lowest was 29 per cent.

Bernard Smith examined 29 samples, and the lowest percentage he found was 32.45 per cent and the highest 39.11 per cent, the average of the 29 samples being approximately 37 per cent. My work was done with solutions varying from 37.2 per cent to 37.4 per cent, and will be discussed in percentages of formalin, the name by which the watery solution is best known, of about 37.2 per cent formic aldehyde.

ORIGINAL WORK

ANTISEPTIC POWER OF FORMALIN. A series of experiments was made to determine the amount of formalin necessary to restrain the development of bacteria and molds in stable manure, garden earth, etc. For this purpose nutrient broth was placed in sterile flasks and formalin added in proportions of 1 to 7,000 down to 1 to 500. The broth was then inoculated with the various materials, kept at room temperature, and observed for fourteen days.

It was found that in the flask to which garden earth was added that bacterial growth ceased in the dilution of 1 to 5,000, and mold developed on the seventh day in the dilution of 1 to 1,000.

In the flask to which stable manure was added bacterial growth occurred in the dilution of 1 to 4,000, and mold on the seventh day in 1 to 1,000.

In the flask to which were added bits of hay bacterial growths occurred in a dilution of 1 to 4,000, and mold on the fourth day in a dilution of 1 to 1,000.

It will be seen that the lowest dilution in which bacterial growth occurred was 1 to 4,000, and molds in 1 to 1,000.

ANTISEPTIC POWER AGAINST PURE CULTURES.

The above experiment having been made to determine its restraining influence for putrefactive changes, another series was made to determine its antiseptic action against pure cultures of bacteria.

For this purpose bouillon containing various proportions of formalin was distributed in sterile test tubes and each tube was then inoculated with a small loopful of a 48-hour agar culture of the particular organism, placed in the incubator at 37 degrees C., and observed daily for 15 days. The formalin used contained 37.2 per cent formic aldehyde.

The results are shown in the following table:

TABLE I.

SUMMARY SHOWING LOWEST DILUTION IN WHICH ALL GROWTH WAS RESTRAINED

ORGANISM	Dilution in which All Growth Was Restrained
Staphylococcus epidermidis albus	1 to 4,000
Staphylococcus pyogenes albus	1 to 3,000
Staphylococcus pyogenes aureus	1 to 3,000
Staphylococcus pyogenes citreus	1 to 3,000
Bacillus typhosus	1 to 3,000
Bacillus coli communis	1 to 3,000
Bacillus dysenteriæ (Shiga)	1 to 4,000
Bacillus pyocyaneus	1 to 3,000
Bacillus choleræ	1 to 6,000
Bacillus diphtheriæ	1 to 5,000
Bacillus mallei	1 to 6,000
Bacillus anthracis	1 to 4,000
Bacillus pestis	1 to 5,000
Bacillus megatherium	1 to 6,000
Bacillus subtilis	1 to 3,000
Bacillus prodigiosus	1 to 3,000
Bacillus acidi lactici	1 to 6,000
Bacillus proteus	1 to 6,000
Bacillus enteritidis	1 to 3,000

From the above it will be seen that many of the organisms used grew in dilutions as low as 1 to 4,000; a few were restrained in a dilution of 1 to 6,000; none grew in a stronger solution than 1 to 3,000.

GERMICIDAL POWER OF FORMALIN. The germicidal power of formalin in various strengths was studied on pure cultures, human fæces and sputum. The growth in broth tubes was principally used. Agar plates were also made at corresponding intervals in order to determine when the maximum effect of formalin is exerted.

GERMICIDAL POWER AGAINST PURE CULTURE. The germicidal power of formalin was determined in 1, 2, 3, 5 and 10 per cent dilutions against the principal pathogenic organisms. The following method was observed in each case: For a 5 per cent strength 94 c.c. of sterile water was placed in a sterile flask and 1 c.c. of a heavy emulsion freed from clumps, of a 48-hour slant agar culture of the organism being studied, was added; then 5 c.c. of formalin was added to the entire contents of the flask and well shaken. One loopful at 10-minute intervals up to one hour was planted in a full tube of nutrient bouillon and the growth noted from day to day.

The experiments were repeated in each dilution so as to check any irregularities that might occur.

The results of the experiments, summarized, show that 1 per cent formalin containing 37.2 per cent aldehyde killed the vibrio of cholera in 10 minutes, *B. coli* in 90 minutes, *B. diphtheriæ* in 20 minutes, *B. mallei* in 10 minutes, *B. pyocyaneus* in 40 minutes, *B. dysenteriæ* and *Staphylococcus albus* grew up to 2 hours, and *Staphylococcus pyogenes aureus* and *B. typhosus* were killed in 90 minutes.

Two per cent formalin (containing 37.2 per cent aldehyde) killed *B. coli* after 60 minutes' exposure, *B. diphtheriæ* after 10 minutes, *B. pyocyaneus*, 10 minutes, *B. dysenteriæ*, 60 minutes, *Staphylococcus pyogenes albus*, 60 minutes, and *Staphylococcus pyogenes aureus* and *B. typhosus* after 40 minutes.

Three per cent formalin (containing 37.2 per cent aldehyde) killed *B. coli* after 30 minutes' exposure, *B. dysenteriæ*, 40 minutes, *Staphylococcus pyogenes albus*, 30 minutes, *Staphylococcus pyogenes aureus*, 20 minutes, and *B. typhosus* after 20 minutes.

Five per cent formalin (containing 37.2 per cent aldehyde) killed *B. coli* and *Staphylococcus pyogenes albus* after 30 minutes' exposure, *B. dysenteriæ* after 40 minutes, *Staphylococcus pyogenes aureus* and *B. typhosus* after 20 minutes.

Ten per cent formalin (containing 37.2 per cent aldehyde) killed all the non-spore-bearing organisms tested in less than

10 minutes, except *B. dysenteriæ* and *Staphylococcus pyogenes aureus*, which were killed after 10 minutes.

TIME OF MAXIMUM GERMICIDAL EFFECT. In order to study when the greatest germicidal action is exerted, pure cultures of the five most resistant organisms were exposed to a 2 per cent and a 3 per cent solution of formalin. The dilutions were made just as in the preceding experiments, but instead of making plants in broth a loopful of the exposed culture was put into a full tube of melted agar and then poured into a petri dish which, as soon as the agar had hardened, was placed in the incubator.

The colonies were counted on the fourth day. Plants were made at 5-minute intervals, except in the case of *B. pyocyaneus*, when exposed to 3 per cent formalin, and then plants were made at 2-minute intervals.

It was found that with a two per cent solution of formaldehyde the maximum germicidal effect was exerted in the first five minutes.

With a three per cent solution this immediate effect is more apparent, and in the case of *B. pyocyaneus* the great mass of organisms is killed in the first two minutes.

ACTION ON FÆCES. Its germicidal action having been determined against pure cultures, experiments were done to determine its value as a disinfectant of human excreta.

Human fæces with urine added were thoroughly mixed with sufficient water so that there should remain no large clumps. A watery suspension from a number of 48-hour agar slants of *B. pyocyaneus* was added to the mixture and well mixed in, this being done on account of the green color it shows in culture, which was used as an index of the destruction of the non-spore-bearing organisms. To an accurately measured quantity of this mixture sufficient formalin was added so as to give a 3 per cent, 5 per cent or 10 per cent dilution by volume of formalin. Plants were made into broth tubes and agar, which latter were at once poured into petri dishes. The growth in the broth tubes was observed for ten days; the colonies on the plates were counted on the fourth day.

A 3 per cent solution destroys a great majority of the non-spore-bearing organisms in fæces in the first 10 minutes, a few, however, resisting a somewhat longer exposure; the spore-bearing organisms grew up to 120 minutes.

Five per cent formalin acting upon fæces destoyed most of the non-spore-bearing organisms within 10 minutes; a few resisted 40 minutes. The spore-bearing organisms resisted as long as 60 minutes.

Fæces exposed to 10 per cent formalin solution were rendered practically sterile immediately; a few colonies developed in 10 minutes. The spore-bearing organisms were destroyed after 40 minutes.

A 10 per cent solution of formalin completely deodorized fæces at once. A 3 and 5 per cent solution rendered them almost odorless after a very few minutes' exposure.

On account of its germicidal efficiency and deodorant action formalin would seem to be one of the most useful agents for the disinfection of infected human discharges when used in a 10 per cent dilution, allowing an exposure of one hour after thorough mixing.

DISINFECTION OF SPUTUM. In order to determine the efficiency of formalin for the destruction of tubercle bacilli in sputum, the following experiment was done:

Ten cubic centimeters of sputum from an advanced case of pulmonary tuberculosis were added to 180 cubic centimeters of sterile water and the mass of sputum broken up as much as possible. An amount of the mixture of sputum and water equal to that used to inoculate the guinea pigs after exposure to formalin was given to a guinea pig as a control. Sufficient formalin was added to the sputum to make a 5 per cent solution by volume. At intervals of 15 minutes up to 1 hour a small amount was given to a guinea pig intraperitoneally with the following result:

TABLE II.

TIME	DEATH IN	POST MORTEM FINDINGS
15 minutes.	71 days	Generalized tuberculosis.
30 " .	31 "	Generalized tuberculosis.
45 " .	72 "	Generalized tuberculosis.
60 " .	Killed 5 months later	No indication of tuberculosis; had gained in weight.

The control pig died in 35 days with lesion of generalized tuberculosis.

The experiment was repeated with another specimen of sputum with practically the same result.

It would seem, from the above, that 5 per cent formalin in one hour was sufficient to render tuberculous sputum harmless.

ACTION OF FORMALIN ON TETANUS AND DIPHTHERIA TOXINS. Aronson called attention to the fact that formalin in the proportion of 1 to 500 added to diphtheria toxin was sufficient to protect a guinea pig against 100 fatal doses of the toxin.

Burckhard found that formalin, when added to tetanus toxin in the proportion of 1 to 250, was sufficient to protect a mouse against a dose of tetanus toxin that caused the death of the control in twenty-four hours. Burckhard does not seem to have determined the fatal dose of his tetanus toxin.

Neither of them states how long the formalin was left in contact with the toxin before it was injected into the animal.

My work on the action of formalin was all tested on guinea pigs and the MLD of the toxins accurately determined.

Pure tetanus and diphtheria toxins, of which the MLD had been accurately determined, were exposed to various percentages of formalin for varying lengths of time. It was found that when tetanus toxin is exposed to 5 per cent formalin for six hours, a guinea pig is able to withstand 100 MLD of this formalinized toxin; that 3 per cent formalin after twenty-four hours' exposure protects against the toxin; that 3 per cent formalin, after one hour, destroys a part of the toxin, and that its action increases with the length of exposure.

Diphtheria toxin is more susceptible than tetanus toxin, as 4 per cent formalin, after six hours' exposure, protects a guinea pig against acute death, paralysis, however, not being prevented. One per cent, after twenty-four hours' exposure, has the same effect. Its action against the toxin increases with the length of exposure.

This action of formalin on toxin is an important property in its use as a disinfectant, for not only are the bacteria themselves destroyed, but their soluble products as well.

Attempts have been made to treat certain septicemic conditions by means of the intravenous injection of weak formalin solutions, but without much success. Perhaps more success would attend its use in localized infections where there is a nest of germs elaborating a toxin, which is absorbed and distributed throughout the system. This phase of the subject, it is hoped, will be treated in a later paper.

SUMMARY AND CONCLUSIONS. Formalin in the proportion of 1 to 5,000 was sufficient to restrain all bacterial growth in bouillon contaminated with garden earth. Molds developed in a dilution of 1 to 1,000.

In a dilution of 1 to 4,000 formalin restrains bacterial growth in bouillon contaminated with stable manure.

A dilution of 1 to 4,000 restrains bacterial growth in bouillon contaminated with wisps of hay. Molds developed in a dilution of 1 to 1,000.

A dilution of 1 to 3,000 restrained all bacterial growth in pure cultures of thirteen different organisms. Some were restrained in a dilution of 1 to 4,000 and a few in a dilution of 1 to 6,000.

One per cent formalin, containing 37.2 per cent aldehyde, killed the vibrio of cholera in 10 minutes, *B. coli* in 90 minutes, *B. diphtheriæ* in 20 minutes, *B. mallei* in 10 minutes, *B. pyocyaneus* in 40 minutes, *B. dysenteriæ* and *Staphylococcus albus* grew up to 2 hours, and *Staphylococcus pyogenes aureus* and *B. typhosus* were killed in 90 minutes.

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Three per cent formalin (containing 37.2 per cent aldehyde) killed *B. coli* after 30 minutes' exposure, *B. dysenteriæ*, 40 minutes, *Staphylococcus pyogenes albus*, 30 minutes, *Staphylococcus pyogenes aureus*, 20 minutes, and *B. typhosus* after 20 minutes.

Five per cent formalin (containing 37.2 per cent aldehyde) killed *B. coli* and *Staphylococcus pyogenes albus* after 30 minutes' exposure, *B. dysenteriæ* after 40 minutes, *Staphylococcus pyogenes aureus* and *B. typhosus* after 20 minutes.

Ten per cent formalin (containing 37.2 per cent aldehyde) killed all the non-spore-bearing organisms tested in less than 10 minutes, except *B. dysenteriæ* and *Staphylococcus pyogenes aureus*, which were killed after 10 minutes.

With a 2 per cent solution of formaldehyde the maximum germicidal effect was exerted in the first 5 minutes.

With a 3 per cent solution this immediate effect is more apparent, and in the case of *B. pyocyaneus* the great mass of organisms is killed in the first two minutes.

A 3 per cent solution destroys a great majority of the non-spore-bearing organisms in fæces in the first 10 minutes, a few, however, resisting a somewhat longer exposure; the spore-bearing organisms grew up to 120 minutes.

Five per cent formalin, acting upon fæces, destroyed most of the non-spore-bearing organisms within 10 minutes; a few resisted 40 minutes; the spore-bearing organisms resisted as long as 60 minutes.

Fæces exposed to 10 per cent formalin solution were rendered practically sterile immediately; a few colonies developed in 10 minutes. The spore-bearing organisms were destroyed after 40 minutes.

A 10 per cent solution of formalin completely deodorized fæces at once. A 3 and 5 per cent solution renders them almost odorless after a very few minutes' exposure.

On account of its germicidal efficiency and deodorant action formalin would seem to be one of the most useful agents for the disinfection of infected human discharges when used in a 10 per cent dilution, allowing an exposure of one hour after thorough mixing.

Bacilli in tuberculous sputum were killed after an exposure to 5 per cent formalin for 60 minutes. Sputum exposed for 15, 30 and 45 minutes respectively still contained live tubercle bacilli.

When tetanus toxin is exposed to 5 per cent formalin for 6 hours a guinea pig is able to withstand 100 MLD of this formalinized toxin. Three per cent formalin, after 24 hours' exposure, protects against the toxin; it destroys a part of the toxin in 1 hour, its action increasing with the length of exposure.

Diphtheria toxin is more susceptible than tetanus toxin, as 4 per cent formalin, after 6 hours' exposure, protects a guinea pig against acute death; paralysis, however, is not prevented. One per cent, after 24 hours' exposure, has the same effect. Its action against the toxin increases with the length of exposure.

This action of formalin on toxin is an important property in its use as a disinfectant, for not only are the bacteria themselves destroyed, but their soluble products as well.

For details of experiments and full discussion of the literature, see "The Antiseptic and Germicidal Properties of Solutions of Formaldehyde and their Action upon Toxines," by John F. Anderson. Hygienic Laboratory Bulletin No. 39, U.S. Pub. Health & Mar.-Hosp. Serv., Washington, 1907, 48 p. 8vo.

THE SPECIFIC NATURE OF ANAPHYLAXIS * †

By M. J. ROSENAU and JOHN F. ANDERSON

From Hygienic Laboratory, Public Health and Marine-Hospital Service

From our first studies upon hypersusceptibility we were interested in the question, "Is this reaction specific?"

In our work upon the toxic action of horse serum ‡ we showed that this reaction is quantitatively specific for serums; that is, guinea pigs sensitized with horse serum are subsequently very susceptible to a second injection of horse serum, but only slightly if at all susceptible to a second injection of the serum of other animals, such as rabbit, cat, dog, hog, sheep, chicken or man. Conversely, guinea pigs sensitized with the serum of these other animals are not very sensitive to a second injection of horse serum, whereas they respond actively to a subsequent injection of the same serum used for the first injection.

We have further shown § that the specific nature of this phenomenon is more marked when proteid substances of widely different nature are used at the first and second injections. Thus a guinea pig sensitized with horse serum does not react to a subsequent injection of egg-white, vegetable proteid or milk. A guinea pig sensitized with egg-

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[*] Journ. of Infectious Diseases, Vol. IV, 1907, p. 552.

[†] Abstract of paper read before the Laboratory Section, American Public Health Association, at Atlantic City, September 30, 1907.

[‡] Hyg. Lab., Bull. 29, U.S. Pub. Health & Mar.-Hosp. Serv., Washington, April, 1906, pp. 1–95.

[§] Hyg. Lab., Bull. 36, U.S. Pub. Health & Mar.-Hosp. Serv., Washington, April, 1907, pp. 1–67.

white does not react to a subsequent injection of horse serum, vegetable proteid or milk. A guinea pig sensitized with milk does not react to the other proteid substances mentioned.

We have recently succeeded in demonstrating more clearly the specific character of the phenomenon we are studying by proving that guinea pigs may be in a condition of anaphylaxis to three proteid substances at the same time. For instance, a guinea pig may be sensitized with egg-white, milk and horse serum and subsequently react to a second injection of each one of these substances. The guinea pig may be sensitized by giving these strange proteids either at the same time or at different times, in the same place or in different places, or by injecting them separately or mixed. The guinea pig differentiates each anaphylactic-producing proteid in a perfectly distinct and separate manner. The animal is susceptible to the second injection of each one of the three substances in the same sense that it is susceptible to three separate infectious diseases.

These experiments, which we now wish to record, were divided into three series. In the first the guinea pigs were sensitized with horse serum, egg-white and milk, in different parts of the body, but at the same time. In the second series the three substances were thoroughly mixed and then injected into the guinea pig. In the third series the animal was first given an injection subcutaneously of milk, fourteen days later an injection of egg-white, and fourteen days after that an injection of horse serum.

All of the animals, after at least fourteen days from the last injection, were then given the second injection of one of these substances. Those animals that survived the injection of the first substance were given, usually after an interval of one day, one of the other substances used, and those withstanding it were finally tested for susceptibility to the third substance used. As will be seen from the detailed experiments, some of the animals survived after having had severe symptoms as a result of injections of all three of the proteids used.

Attention is drawn especially to one of the guinea pigs (No. 1,019). This animal reacted sharply to the second injection of milk. The guinea pig presented the usual symptoms from which it gradually recovered. *Five hours* after the injection of milk it was given an injection of egg-white from which it died. These two reactions in so brief a time seem to accentuate the specific nature of the phenomenon we are studying.

The following conclusions were drawn:

Guinea pigs may be sensitized to three strange proteids, viz., blood serum, egg-white and milk, at the same time. The hypersusceptibility to each proteid substance is manifested by a second injection of the corresponding proteid. The three reactions are as distinct and specific as three separate infectious diseases. We, therefore, feel justified in concluding that the phenomenon of anaphylaxis is specific. We further believe that this work indicates that chemical changes, rather than morphological alterations, lie at the basis of this reaction.

NOTE ON METHOD OF DETERMINING TOTAL AND VOLATILE SUSPENDED MATTER IN SEWAGE*

By C. B. YOUNG and C. F. LONG

In following the method of Kimberly and Hommon for the determination of suspended matter in sewage, as outlined in Public Health, Volume 31, Part II, page 123, the workers in this laboratory experienced some difficulty with the method in that, after ignition of the suspended matter, the weight of the crucible and ignited suspended matter would fall below the initial weight of the crucible and mat alone. The writers had this difficulty with a large number of determinations, and a very large number showed abnormally high values for volatile matter, indicating that loss was taking place somewhere.

In order to dispose of the danger of the asbestos still containing some soluble matter, and to satisfy ourselves that no particles of the mat were passing through the Gooch when suction was applied in filtering, thereby causing a loss on the first weighing (before ignition), several mats were prepared in the usual manner and ignited at a low temperature for five minutes, washed with from 100 to 200 c.c. of distilled water, dried in the air bath and reweighed. The second weighing in each case checked the first, thus showing that no soluble matter was being dissolved from the mat and that no particles were being pulled through by the suction.

In the preparation of the asbestos, the washing by decantation is very slow, as the asbestos settles slowly and loosely, and it was found preferable to stir up the asbestos with water in a beaker, then pour off through a perforated plate placed in a large funnel, finally transferring the whole contents to the funnel and allowing it to drain. Then place the asbestos back in the beaker and stir up with water and transfer to the funnel as before. By this method one does not have to wait until the asbestos settles; a much larger proportion of the washed water is also removed, thus greatly diminishing the number of washings and amount of water necessary to wash the asbestos. The cream used should contain enough asbestos that in order to make a mat of proper thickness 50 to 100 c.c. of the cream must be poured through the Gooch. Then, in order to make sure that no particles of the mat be drawn through in filtration of the sample, it is well as soon as it is formed to pour some distilled water through. We have not found that this precaution is necessary, but for new workers we would advise it.

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* Contribution from the Laboratory of the Ohio State Board of Health. Read before the Laboratory Section, American Public Health Association, at Atlantic City, September 30, 1907.

During the course of the work various kinds of asbestos were used and experimented with, in order to determine which might be the best adapted to the above procedure. The kind finally selected was the ordinary "long fibrous asbestos," which was prepared by us as follows: Digest with strong hydrochloric acid on water bath, and then wash from the acid till the washings give no test for hydrochloric acid with silver nitrate. It was found that a mat prepared from this product, thoroughly ground in water, was effective in catching all the finely divided suspended matter.

For ignition of the Gooch crucible and asbestos filter an iron radiator was used, heated with two ordinary Bunsen burners. By this method the iron radiator was heated to dull redness, as described by Kimberly and Hommon. It was thought very probable that insufficient initial heating was the cause for the loss on ignition of the suspended matter. In order to remedy the above defect, a small nickel dish was used, but the same difficulty was experienced. Although the ignition was continued fifteen to thirty minutes, loss continued to take place with final ignition. When, however, the blast lamp was used on the nickel radiator for ten minutes no further loss took place, and no further difficulty was experienced in securing satisfactory results. It was found that vigorous blasting for ten minutes drives off all volatile matter, and when the crucible is placed in the nickel radiator the blasting does not disturb the asbestos in any way. Ignition must be strong enough to give a very distinct red glow to the crucible itself.

The following results, which were taken from the daily notes in this laboratory, will serve to demonstrate the above:

	FIRST IGNITION	SECOND IGNITION	THIRD IGNITION	FOURTH IGNITION
Ignition for ten to fifteen minutes in iron radiator heated with two Bunsen burners.	11.8758	11.8742	11.8742	11.8740
	12.6525	12.6317	12.6314	12.6312
	12.8997	12.8993	12.8988	12.8985
Ignition same as above, except in nickel dish.	12.9445	12.9434	12.9433	....
	12.6323	12.6317	12.6305	....
	12.8734	12.8717	12.8714	....
Strong ignition for ten minutes in nickel dish heated with blast lamp.	12.1321	12.1321	12.1321	....
	12.2020	12.2020	12.2020	....
	12.5335	12.5335	....	....
	12.8037	12.8037	....	....

REPORT OF COMMITTEE ON TECHNICAL PROGRESS *

Gentlemen: Your Committee on Technical Progress is a standing committee under the constitution of the Laboratory Section, consisting of the chairmen of the various Technical Committees, presided over by the Chairman of the Section. This Committee, to quote the constitution, is responsible for "the scientific work and development of the Section."

At the Havana meeting of the Section, the Technical Committees, then several in number, were cut down to two, and have never since been increased in number. It happens, therefore, that this year, the Chairman of the Water Committee and the Chairman of the Milk Committee form, with the Chairman of the Section, the total membership of the Committee on Technical Progress. Furthermore, because no report has ever heretofore been made by the Committee on Technical Progress, this report is its first.

The writers of the Section constitution had in mind that in most scientific societies every attention is paid to parliamentary organization, but very little to the organization of that which forms the main reason for the existence of such societies, the progress of the particular science or art in question. The attempt was made to provide, in this Section, an organization as complete for its purely scientific side as for its administration.

Your Committee, notwithstanding the absence of precedents for its action, has undertaken to make the following report, reviewing briefly the history of the Technical Committees of the Section to date, and making certain recommendations, with the hope that the Section will accept them as a basis of discussion.

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* Read before the Laboratory Section, American Public Health Association, at Atlantic City, September 30, 1907.

The Laboratory Section was organized in 1899, primarily as the outcome of the success which greeted the efforts of the well-known Committee on Standard Methods of Water Analysis of the General Association. That Committee became a Technical Committee of the Section and continues as such today. Committees on various other subjects were from time to time appointed, but heretofore but small progress has been made, especially since the Havana meeting, when the existing committees were nearly all abolished. Since that time only the Milk Committee has been newly appointed.

RECOMMENDATIONS

Your Committee believes that the results achieved by the Committee on Standard Methods of Water Analysis justifies the Section in continuing its own policy, as exemplified in the appointment two years ago of a Committee on Standard Methods of Milk Analysis, and recommends the appointment of Committees on Standard Methods for the various public health services, and would specify, as called for, a Committee on Standard Methods of Diphtheria Diagnosis, of Typhoid Diagnosis, of Glanders Diagnosis, of Rabies Diagnosis, of Sputum Examination, Syphilis Diagnosis, Gonorrhœal Diagnosis, of Sewage Analysis, of Air Analysis, on Standard Methods of making vaccine, antitoxin, mallein, tuberculin, etc., all as applied to public health work, and also on Mailing Infectious Material and the examination of Embalmers' Fluids.

Your Committee feels that the work of these Technical Committees of the Section should not cease with the standardization of methods; methods should be as uniform, exact and rapid as may be compatible with obtaining the results desired. But the termination of the analysts' work and the announcement of the technical result is but the initiation of the course which that result must run before its true value has materialized. It is very much indeed to obtain a certain analytic result quickly, accurately and by methods applicable to the examination of large numbers of specimens. The most refined results, however, are no better than the most crude, or than none at all, if their meaning is not made known also. It is usually assumed that those capable of securing the technical results must know what those results mean, a totally unwarranted assumption. As the expert telegrapher need not, often cannot, even guess at the significance of a message he transmits, so the analyst need not, often does not, know what his results mean, chiefly because they can seldom be interpreted directly, but generally require other data, not analytical, in conjunction with which they alone become valuable. Interpretation of results should be attacked by your Committee, we believe. As the standardization of methods was at one time believed to be a hopeless task, but is now an accomplished and accepted fact, so also we believe the interpretation of results, an even wider and more complicated field, should be, and with earnest effort will ultimately be, formularized and established.

Your Committee would also suggest that the plan heretofore usually followed, whereby the appointing of Technical Committees by the Council is done without consultation of those appointed, be modified in such a manner that the committees to be appointed may be known beforehand, and members who may wish to serve on such committees be asked to state their preferences. The efficiency of a member of a Technical Committee is usually dependent upon the trend of his own work during the time he is a member; the fact that a Section member has already become well known in relation to a given subject is not a guaranty of efficiency upon a committee dealing with that subject, for his work and interests at the time of appointment on the committee may be in a quite different direction.

H. W. Hill, *Chairman* (*ex officio*).
F. H. Slack.

(Mr. H. W. Clark, the third member was not present.)

[Editor's Note. — The Laboratory Section, in session at Atlantic City, Sept. 30, 1907, accepted this report and went into committee of the whole to discuss it. As a result, the Section voted that the Council of the Section should undertake the carrying out of the recommendations made, prepare a list of committees, secure an expression from each member of the Section as to his preferences, and, on the basis of these returns, appoint the committees.]

TECHNICAL COMMITTEES OF THE LABORATORY SECTION, A.P.H.A.

By vote of the Council of the Laboratory Section, the following committees have been appointed:

Committee on Standard Methods of Bacterial Water and Sewage Analysis, D. D. JACKSON, Mount Prospect Laboratory, Brooklyn, N.Y., Chairman.

Committee on Standard Methods of Chemical Milk Analysis, PROF. J. O. JORDAN, 30 Huntington Avenue, Boston, Mass., Chairman.

Committee on Standard Methods for the Bacterial Diagnosis of Diphtheria, MR. B. R. RICKARDS, 739 Boylston Street, Boston, Chairman.

Committee on Standard Methods for the Bacterial Diagnosis of Typhoid, DR. F. F. WESBROOK, University of Minnesota, Minneapolis, Minn., Chairman.

Committee on Standard Methods for the Bacterial Diagnosis of Tuberculosis, DR. M. P. RAVENEL, University of Wisconsin, Madison, Wis., Chairman.

Committee on Standard Methods for the Analysis of Air, PROF. C.-E. A. WINSLOW, Massachusetts Institute of Techonology, Boston, Chairman.

Committee on Standard Methods for the Diagnosis of Rabies, DR. ANNA WILLIAMS, Research Laboratory, East 16th Street, New York City, Chairman.

Committee on Standard Methods for the Bacterial Diagnosis of Glanders, DR. W. L. BEEBE, St. Anthony's Park, Minn., Chairman.

Committee on Standard Methods of Preparing Diphtheria Antitoxin, DR. H. D. PEASE, State Antitoxin Laboratory, Albany, N.Y., Chairman.

Committee on Standard Methods of Preparing Smallpox Vaccine, Dr. J. H. Huddleston, 126 West 85th Street, New York City, Chairman.

Committee on Standard Methods for the Preparation of Tuberculin and Mallein, Dr. V. A. Moore, Cornell University, Ithaca, N.Y., Chairman.

OTHER COMMITTEES

Committee on Mailing Infectious Material, Dr. M. L. Price, Secretary State Board of Health, Baltimore, Md., Chairman.

Committee on Standard Methods for the Bacterial Diagnosis of Syphilis, Dr. H. U. Williams, University of Buffalo, Buffalo, N.Y., Chairman.

COMMITTEES PREVIOUSLY ESTABLISHED

Committee on Standard Methods of Chemical Water and Sewage Analysis, Prof. E. B. Phelps, Massachusetts Institute of Technology, Boston, Chairman.

Committee on Standard Methods for the Bacterial Analysis of Milk, Dr. F. H. Slack, 739 Boylston Street, Boston, Chairman.

The committees just appointed will be expected to plan their work for the coming year and to furnish the Section with a short report of such plans at the coming meeting in August. The Chairmen are referred to Section 30 of the Constitution (Transactions, Vol. XXXI, Part II, page 254) for information relating to the addition of advisory members to their committees, and also to Sections 28 and 29 for other information for their guidance.

B. R. RICKARDS, *Secretary*,
For the Council, *Laboratory Section*.

The Massachusetts Association of Boards of Health

APRIL QUARTERLY MEETING

Boston, Mass.

The quarterly meeting of the Association was held at the Brunswick Hotel, Boylston Street, Boston, on Thursday, April 30, 1908. President Walcott presided at the dinner, and Vice-President Durgin at the business meeting which followed it.

VICE-PRESIDENT DURGIN. It is moved and seconded that the reading of the records of the last meeting be dispensed with.

The motion was adopted.

VICE-PRESIDENT DURGIN. The Executive Committee have a report to make which the Secretary will read.

MR. COFFEY. The Executive Committee recommend the following for membership: Edward H. Gallup, of the Hyde Park Board of Health; Dr. Elliott Washburn, State Inspector, Taunton, Mass.; Dr. Merrick Lincoln, of the Worcester Board of Health; Prof. Charles F. Nixon, Bacteriologist of the Leominster Board of Health; Dr. Carlisle Reed of Boston; Dr. Homer L. Conner of the Haverhill Board of Health; Charles M. Hickey, Chairman of the Brockton Board of Health; Dr. Winfred L. Howe of the Everett Board of Health; Dr. W. J. Sleeper of Westford; Dr. George W. Dow, Medical Examiner, Lawrence; Zebedee E. Cliff of the Somerville Board of Health; Wm. G. Kirschbaum, L. Z. Normandie, M.D., and S. M. Kennedy, D.D.S., New Bedford.

The gentlemen named were elected members of the Association, on motion of Dr. Rose.

VICE-PRESIDENT DURGIN. The first business on the program is a paper on, "The Transmission and Methods for Control of Measles," by Dr. D. D. Brough of Boston.

THE TRANSMISSION AND METHODS FOR CONTROL OF MEASLES

By DAVID D. BROUGH, M.D.
Medical Inspector, Boston Board of Health

The problems that confront a Health Board in the prevention and care of infectious diseases vary with each kind of disease. It is impossible to lay down any general law to cover all the cases; no absolute rule can be laid down for a method of procedure. We should, as far as possible, adapt our knowledge to a scientific basis. In smallpox we have an absolute safeguard for the public in vaccination, but even today we have persons, even physicians, who are so shortsighted as to deny its efficacy. In other diseases, as diphtheria, where we have an antitoxin both as a curative agent and a valuable immunizing factor, there still arise questions that health officials are not yet agreed upon, as what to do with diphtheria bacilli which are present in well persons, and what to do with persistent bacilli in convalescents. Typhoid has its problems, with the long continuance of the bacilli in the stools or urine. In leprosy the question of complete segregation has not been completely settled.

When we come to the question of a disease of the nature of measles, where we have no absolute knowledge of the cause, and where no vaccine nor immunizing agent has yet been discovered, we find varying opinions among health officers and physicians. Each man feels he is a law unto himself.

Measles is a very old disease. It is said to have made its appearance first on the regions bordering on the Red Sea. The first clear mention is by Rhazes, an Arabic physician, in 910 A.D. It was not until 1670–1671 that is was clearly defined and differentiated from smallpox by Sydenham.

Bacteriology, up to the present, has given us nothing definite as to the cause of measles. A large amount of work has been done by painstaking workers. Bacilli have been found in the blood by some, and others have found organisms which they claim to be protozoa, but nothing absolute has yet been agreed upon.

Inoculation experiments have proved at times to be apparently successful, but the element of human infection has not been eliminated. With the exception of inoculation by nasal mucus by Hebra and the two cases of Hektoen with blood, authorities still doubt the inoculability of measles. All the successful inoculations that are claimed to have been done have been performed with the blood or mucus in the very early stages. All inoculations with the scales of desquamation have proved negative.

INFECTIOUS NATURE AND GENERAL SUSCEPTIBILITY TO THE DISEASE. Almost every one is susceptible to measles; it attacks all races and appears in every part of the world. Those who are exposed to the disease and do not contract it have almost invariably had measles at some previous period. Adults, old age, youth and children all contract it. There is one noticeable exception, children under six months of age have a relative, if not absolute, immunity, or are rather less susceptible than at other ages. In the records of 7,690 consecutive cases of measles in Boston Board of Health reports, I can only find 85 cases of 6 months and under, and of these only 41 were under 6 months. These are not accidental figures, but appear in a study of the health records of measles everywhere, and most writers agree on this fact. Why this relative immunity is hard to explain. In an outbreak in a hospital where there were 40 children under 1 year, only 7 acquired the disease; while in outbreaks in schoolrooms in this city practically all the children acquire the disease. In one class in this city, of children between the ages of 5 and 7, out of 44 children only 6 escaped.

In large cities the disease is always present in endemic form. In Boston some sections will have the disease, while other parts will be free, then suddenly finding suitable soil it breaks out in epidemic form.

PROTECTION BY ONE ATTACK. It may be stated in a general way that one attack usually protects for life. Secondary cases are rare, though they are occasionally reported. I have at times seen cases of measles where the patient has claimed to have the disease before. The absence of definite proof regarding the nature of the first attack should make us accept such statements with caution. Sometimes what is claimed as a second attack will be found to be some other disease. Careful observers of numerous cases find few second attacks.

Panum, in the outbreak in the Faroe Islands in 1846, did not see a second attack among six thousand cases.

Hoff, who investigated a second outbreak in these islands in 1875, is inclined to doubt if second attacks occur.

Williams, in twenty years' experience, did not see one secondary case.

Widowitz * declares that among several thousand cases he could observe only one instance of a second attack of measles.

Camby, in seven hundred cases, did not see a second attack.

Experience indicates their great infrequency. Many cases of what are called secondary attacks may be due to errors in the diagnosis of the primary case.

Cases where an eruption reappears in a very short period

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* Pub. Health, August, 1907, p. 693.

are really instances of auto-infection or relapses rather than second attacks.

MORTALITY. The disease is most fatal in the early years of life. The number of deaths in the years from one to five is always much greater than the years from five to fifteen. Therefore if there is a desire to reduce the mortality the effort must be to prevent the children in the early years of life from acquiring the disease.

Dr. Eberstaller, in his records of sixteen years for the town of Graz, Germany, finds that in the first year the mortality runs as high as from 16 to 35 per cent. It is fortunate that children under six months are not very susceptible, or we would have a tremendous death rate. In the ages from one to five he found the rates from 2.6 to 5.5, while in children from five to ten years it is only .1 to .3 per cent.

In London the death rate is five or six times as great in the first two or three years as it is after five years. Out of the deaths from measles in England, 1862–1872, nine-tenths occurred in the first five years. Out of 367,000 deaths from measles in England from 1848–1887, 335,000 occurred in children under five years.

In the State of Connecticut reports from 1894 to 1903, out of 1,036 deaths from measles, 799 were under five years. In the United States Census reports, 1900, in the list of registration cities, 3,091 died from measles; 2,696 were under five years, while only 395 were of the ages from five to fifty-nine.

The same kind of figures can be duplicated in many health reports that I have consulted from various parts of the United States. Measles is not the light and trivial disease to be carelessly treated. In the circular sent out by the Chicago Board of Health it is stated that the mortality in children under two years is about one in five cases. If children must have the disease, the later the better. Health

Boards must take action in preventing epidemics of the disease.

MORTALITY COMPARED WITH SCARLET FEVER. We are inclined to look upon measles as a light disease and scarlet fever as a severe one. Yet the deaths from measles are actually more in most places than from scarlet fever.

I select a few instances at random:

In census (1900, U.S.) in the registration cities, 3,091 deaths from measles; 2,796 deaths from scarlet fever.

In ten years in Connecticut, 1894–1903, 1,036 deaths from measles; 839 deaths from scarlet fever.

In 1904, New York, 895 deaths from measles; 556 deaths from scarlet fever.

In 1904, Birmingham, England, 204 deaths from measles; 65 deaths from scarlet fever.

In 1906, Philadelphia, 344 deaths from measles; 65 deaths from scarlet fever.

In the reporting towns in Massachusetts, 1904, 1905, 1906, 500 deaths from measles, 326 deaths from scarlet fever. Each year showed more deaths from measles than from scarlet fever.

In Boston during the last six years we have had 349 deaths from measles, 324 deaths from scarlet fever.

It can be seen that in the preventable mortality measles is an important factor.

INCUBATION. In regard to the incubation period our knowledge is based on the epidemics in the Faroe Islands, belonging to Denmark. There the great majority of cases were found to have an incubation period, that is from the reception of the infection organism into the system until the first noticeable symptom appeared, of ten days; from the infection until the eruption generally fourteen days.

A committee appointed by the Boston Society for Medical

Improvement, consisting of Dr. S. H. Durgin, Dr. Elbridge Cutler, Dr. McCollom, Dr. Morse, Dr. Cabot, reported, after careful consideration, that the average incubation period is eleven or twelve days. It may be ten; it may be as long as twenty-one.

In a Special Committee report by the Massachusetts Medical Society, seven or eight years ago, consisting of Drs. Cutler, McCollom and Adams, the results given were: incubation, eleven to twelve days; maybe ten; shorter at times.

In a paper to the Massachusetts Association of Board of Health in October, 1899, Dr. Cutler stated:

"The incubation period of measles is eleven to twelve days. It may be ten, or possibly shorter. On the other hand, it may be as long as fourteen days."

My own experience, where I have been able to time accurately the period of incubation, has been from ten to eleven days to the appearance of the first symptoms.

TRANSMISSION OF MEASLES IN THE PRE-ERUPTIVE STAGE. Over fifty years ago Meyer,* in a chapter on measles, stated that measles was infectious even in the prodromal stage, and this observation has been verified by numerous observers since. It is one of the common ways by which the disease is spread.

Von Kerchensteiner, in the Munich outbreak in 1855, found that in thirty-four cases, ten or twelve days lay between the eruption in the infecting and infected child. Now, as we know the incubation period is about eleven days and the prodromal three to four days, the infection must have occurred in the prodromal period.

In the Infants' Hospital in this city recently a child was bathed in a hot bathroom, and then several other children used this room. Nothing developed on the first child until, two days later it was found to have measles. Three children, who had been exposed in the pre-eruptive stage, came down with the disease. (Dr. J. L. Morse.)

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* Verchow's Handbook of Special Pathology and Therapeutics.

The infection comes chiefly in prodromal stage from the eruption on the mucous membrane, when every cough throws minute droplets into the air to which the infectious material probably adheres. The measles organism seems to resemble a plant that, taken from the soil that nourishes, unless it is at once transplanted into suitable soil, withers and dies.

The Medical Officer of Health for Coveney reports: "Thirteen children attended a dancing class, among whom were two of a friend who had arrived in this district, having come from a place where they had been exposed to measles. There was nothing to attract attention to their condition. The next day, however, they sickened of measles. Within fourteen days eleven of the children came down with the disease, only two who had had it escaping. As they were only associated this day the disease must have been spread in the prodromal stage.

TRANSMISSION IN THE ERUPTIVE STAGE. In the eruptive stage there is abundant evidence to show that it is highly infectious and all observers are agreed here. "From the beginning of the prodromal stage," says Welch, "to the complete disappearance of the eruption is the time of infection."

In the later or desquamation stage there is no direct evidence to show that it is infectious.

TRANSMISSION OF MEASLES. One function of the Boards of Health is to spread true ideas of infectious diseases and to dissipate false. One of the most common ideas, both among the public and also among many physicians, is that the disease is spread by fomites or third persons. In measles the mode of contagion is by direct exposure. It is spread from one case to another. In literature a few cases have been ascribed to fomites, or to intermediary infection. They are, however, few, and the exclusion of personal infection has not been established.

The opinion of most observers is that the infective element is short-lived, and does not live away from the infected person.

In dealing with a disease as measles, where the cause is unknown, we have to rely on the conclusions drawn from a large number of observers.

Richard (*Ther. Gazette*, July 16, 1888) claims contagion of measles cannot be carried by fomites or infected persons.

Bard (*Revue d'hygiène*) states the contagion does not remain viable in a locality from which patients have been removed.

Comby (*Traité des mal de l'enfance*) states germ of measles has little viability outside body, and every germ that radiates is dead in a few hours.

Welch (on Contagious Diseases), referring to carrying contagion by fomites, "Our experience is in accord with most writers that such cases are very rare."

Official Danish reports of 6,000 cases in the Faroe Islands give no instance of transmission by infected articles or by third or intermediary persons.

Rurah, in *Osler's Mod. Med.*, 1907, says: "Measles is transmitted by direct contact in nearly every instance. It is probable that the disease may be transmitted by fomites, if the time elapsing is not great, but it is rare for it to be contracted from an apartment occupied by a measles patient." In regard to this statement I can find no instance where it ever has been contracted from an apartment occupied by a measles patient — no such instance in this city.

In conferring with a large number of physicians I can find none who have, in their experience, known of a case being contracted by fomites or from rooms or from intermediary persons.

At a meeting of the Medical Inspectors of Boston, some years ago, Dr. S. H. Durgin called for an opinion on this subject. The practically unanimous opinion was that it could not be transmitted in this manner.

Investigations amongst physicians who see a great many cases, and are constantly exposed, reveal no evidence of measles appearing earlier in physicians' families than in others.

If the disease cannot be carried, then the necessity for keeping well children at home who have had the disease need not be considered. Formerly our law compelled us to keep all children out of school until seven days after recovery. Now the law allows the attending physician or the Board of Health to give a certificate stating that all danger of infection has passed. This can safely be done in measles cases, even when there are others ill in the family, for they cannot be carriers of the disease.

If children could only be given certificates after they have had measles, which could be placed on file in the schools, something as vaccination certificates are given, I believe it would be a very distinct advantage.

On the question of the transmission of measles, Von Kerchensteiner, health officer for Bavaria, brought it up for discussion in the Munich Medical Society, and in addition called for reports from all sections of Bavaria. The opinion was almost all negative that measles could not be carried.

Some work was attempted in Philadelphia by Dr. Graham and Dr. Harmitt, on the transmission of measles by fomites, but was given up from lack of material and evidence.

The disease, so far as evidence goes, is only spread from the sick to susceptible persons. When one is well from the disease, which we may regard when all signs of catarrhal symptoms and desquamation have ceased, all danger has passed. If there is any possible danger from any other method it is so infinitesimally small as to be entirely neglected.

Among our Boston physicians I can find no authenticated cases of transmission by fomites or by intermediary persons.

Dr. J. L. Morse thinks the organism may live for a few hours after the removal of the infected person.

Dr. E. G. Cutler says that he never in his thirty-three years' experience saw a case where it had been transmitted, except possibly in one instance. That was the case of a nurse who attended a measles patient, and wiped away mucus. She used the same handkerchief on another child to wipe its face, and the second case developed measles. It may have caused it, but he would not hold to it.

Dr. J. H. McCollom never saw or knew of a case of transmission by fomites in his experience.

All stories of transmission by post cards and letters are treated as fables by Von Jurgensen (Nothnagels' Encycl. Pract. Med.).

The following are related as the most convincing instances of transmission by fomites and intermediary persons.

A tailor worked on a boy's suit of clothes in the same room in which his own children were ill with measles and carried it to the boy's house to try on. This boy was taken ill with measles after proper incubation. If this had occurred in an out-of-the-way place where every opportunity for infection was known, it would be a strong argument, but as the place was Dresden, and an epidemic was prevailing at the time, it does not carry much weight.

A physician, during the outbreak in the Faroe Islands, visited a village where no measles was present. He was rowed four miles in an open boat. As he came from an island where measles was present, and fourteen days later measles broke out in the house where he slept, it was supposed he carried the disease. But Hoff, who investigated the case, found that one and probably several of the boat crew had the disease and slept in the village with the doctor, and that they were probably the carriers.

As Dr. A. H. Doty says: "Cases which upon superficial investigation may appear to be transmitted by clothing, etc., are, upon exhaustive investigation, commonly found to be caused by the presence of other cases."

The negative evidence of immediate transmission is so great and so abundant that such cases must be proved beyond a doubt before they can be accepted. We have numerous cases of infected clothing being carried by laundresses and others to susceptible households, and yet we hear of no case of transmission. Look at the immense number of books from libraries and schools from measles households, and yet we hear of no case of transmission.

Flindt reports a case on the Island of Samsoe:

"In one school the same room, books and desks were used by two classes. The younger used the room in the morning and the older in the afternoon. In the younger the disease was prevalent for more than a month before it appeared in the upper class and only here after some of its members contracted it at home, and then it spread as it had in the other class." This he says is conclusive evidence to me against its being spread by articles of use.

In the history of outbreaks of various infectious diseases it has been found that water, milk or some articles of food have been carriers of contagion. In typhoid the records are numerous. In diphtheria and scarlet fever there are frequent and well authenticated cases. In our own city several outbreaks of scarlet fever and possibly diphtheria have been traced to infected milk or some food supply, but never can I find either in this city or elsewhere any outbreaks of measles having been caused or suspected to have been caused otherwise than by direct infection.

NOTIFICATION. The first step in the control of an infection is that the cases shall be reported to the central office and a record of all reported cases kept on file. As time goes on Health Departments find it necessary to extend the scope of their compulsory notifications. Every

Health Department finds, sooner or later, that some method must be taken to check measles. Up to 1882 measles was not reported in Boston.

In 1882–1883 the Boston Board of Health, in view of the increase in deaths from measles, began to take more stringent action in regard to the disease. As the report of that year says, "Measles is now increasing and steps will at once be taken to check the disease," and calls for more room for isolation and to insist on having the cases reported. In 1883 cases first began to be reported, slowly at first, but gradually increasing, and no one doubts that this has been of great value.

Some seventeen years later similar ideas are expressed in the report of the health officer of Birmingham, England. He endeavors to get the addresses of the cases and to send circular of instructions, so that necessary precautions may be taken.

In 1901 the London County Council placed measles on the list of dangerous infectious diseases. I find the reports of health officers over this county appeal for more care in this disease.

There has been a steady improvement in the number of cases reported in this city, and proportionally more are reported than ever. A great many cases are treated without a physician and are not reported, although the family are legally obliged to do so. I hope the time will come when the public will have true ideas on the seriousness of the disease, and it is on health boards that the responsibility for the spread of correct ideas must fall.

It is no argument to say that because many cases are not reported that it is useless to trouble about reporting at all. The same may be applied to any of the other infectious diseases where cases are still not reported.

When as many years have been devoted to educating the public on the subject of measles as in other diseases, we will have a great improvement.

For any efficient health work to be done in measles it is necessary that all cases possible be reported.

It is a question whether rubella, or German measles, should not be added to the list of compulsory notifications. It seems to me that the disease is a distinct entity, and, lying as it does on the border between measles and scarlet fever, public safety would demand its report.

It is advisable, also, that physicians should, if possible, visit again a case that has been treated as rubella, or German measles, in a week or ten days to see no error has been made. Occasionally I have found cases treated as German measles desquamating freely, showing that they were really cases of scarlet fever. Any danger of error would be obviated if the attending physician made a later visit.

ISOLATION. The next step in the control of a disease is isolation. If we wish to do anything we cannot stop at simply notification. Therefore the next procedure is to see that the cases are isolated at home and the family instructed into the care of the disease. The medical inspectors in Boston now visit the home of every case of the disease. I know it seems a hopeless task, yet a beginning must be made. Parents treat it too lightly. I believe that to every family where measles is present some card with simple directions should be sent, as is now done in Boston.

It is only in a comparatively small number of places in the city that we can get good isolation; the isolation of the wealthier parts of the city and the suburban districts is, of course, very different than from the crowded parts of the city. Where there are only two, three, four or five rooms, one feels as if it were hopeless to attempt to isolate. But it must be done. The family can be told to keep the sick child in and watch the susceptible children. Keep the sick ones in and do not have other children running in and out. Tell them the seriousness of the disease, how it is spread, and have them try and do something. If we do not instruct, educate, try to do something in the way of isolation, then we must give up. For it would be impossible for any city to build hospitals large enough to care for all measles patients. As one physician said, if no precautions are to be taken, what is the use in reporting cases?

The carrying power of measles is probably not great. If the case is isolated early, much may be done to keep others in other apartments from getting the disease. All visitors and all not members of the family should be kept away. Household companions should be kept out of school if they have not had measles. Those who have had the disease can go out or return to school.

Our efforts must go to home isolation. If that fails we can do little. In spite of the fact that we are soon to have a measles pavilion in Boston, all that that can do will be to provide accommodations for the cases arising in the various institutions, lodging houses, hotels, etc., where the demand for hospital accommodation will be imperative.

It is impossible to set any absolute time on the period of isolation. The time limit is an indefinite thing. Detroit fixes one week, Buffalo two weeks, Brookline and Fall River two weeks after the eruption fades. Other towns have no definite period, but make the regulations elastic enough to fit the case.

The child should be kept in isolation until all symptoms disappear, all signs of cough, coryza, conjunctivitis and desquamation, and this time may vary in different cases.

Isolation means the exclusion of all children who have not had the disease from school as well as keeping the sick child in a separate room, and absolutely keeping out of the house all strange children. During the first week after exposure it is not absolutely necessary for all the children to stay in the house, but during the second week after exposure this should be insisted upon.

PLACARDING. I believe that considerable good would be done by placing a warning card on the room that the sick patient occupies. It would certainly make the family feel that something was being done. But to put a card on the outside of the house and on the tenement, informing the public that measles is present, is more serious. It is a good thing to put a card up, especially in the more crowded districts. It will certainly keep the sick in and the well and visitors out. But the opposition of the public to more stringent health regulations is always strong. People object strenuously to notices being placed on their houses. Would there result a diminution of the number of cases being reported if the houses were placarded?

I am of the opinion that where the isolation is satisfactory then the need of placarding is less imperative. It is only where the isolation is poor that some other methods are needed to protect others.

Dr. Chapin of Providence thinks there is nothing so little trouble to Health Departments or causes so little trouble to the family as placarding. In Philadelphia, however, many of the medical profession are strongly opposed to it.

The difficulty is this: where the people are intelligent and willing, isolation is well carried on without placarding. Where the people are careless, they do not seem to care; whether the card is up or not it seems to make no difference.

DISINFECTION. The question, shall we disinfect after measles? is constantly arising. There is nothing the public likes to rely on so much as disinfection. There is a constant call for disinfection, without any real basis for the same, that health boards often yield to it as the simplest way out of the dilemma. If there is no real ground for it I do not see why it should be done. It opens a very large question of expense and trouble. It makes no difference whether disinfection is done or not. The result is the same. In schools when the children who are capable of transmitting the disease have been excluded, and the proper period of incubation has passed and no new cases appear, the disease is stamped out. No one can get the disease except from a fresh case of the illness.

The question of disinfection has been seriously considered in other countries.

Some careful work on the question of the retention of infection of measles in houses was carried on in Brighton, England, as given in Dr. Newsholmes's Annual Report for 1904:

"In 1904 there was an epidemic of measles in Brighton, England. It occurred in the spring, and in August and September of the same year every house was visited in which, during the previous seven months, cases had occurred. No disinfection had been carried out in any of these houses. Six hundred and twenty-five houses had been invaded. In 534 of these the occupants were the same as in the first visit, and no further occupants had been attacked. The immunity of 169 children in these houses, who had not previously acquired measles, had continued. Of the remaining houses twenty-three were found to be empty, and in sixty-six of these new families were living or new babies born. Eighty-six children had come into these presumably infected houses. The duration of their exposure was from seventeen days to four and one-half months. None of them acquired measles. It is justifiable, therefore, to presume that the entire experience points in one direction, that the infection of measles is short-lived, and that domestic cleaning suffices for disinfection."

Personally I am of the opinion that this is all that is necessary.

I covered rather closely the point on the transmission of measles. The disease is a personal one from sick to well. The care should be for the patient and not the things. If we are to agree with practically all the evidence, both in this country and abroad, that measles is spread from person to person and that there is no transmission by fomites or intermediary persons, that the rooms after the recovery of measles patients are not infected, then it is unnecessary to disinfect. This is the position today of the best authorities.

Of course, where large Health Departments adopt disinfection, the influence of those bodies has great weight with the public and the inference is drawn, be it right or wrong, that the disease is spread by fomites. In New York City measles is treated the same as scarlet fever or diphtheria. Outside of that city it is not generally done.

In a discussion, reported in January, 1908, Brown Medical Officers of Bermondsey, one of the London districts, states: "Disinfection (in measles) is unwise, as it can accomplish no appreciable good, and is expensive and annoying."

Opinion of Dr. J. L. Morse is sound, that it is a short-lived organism, and that airing the room for twenty-four hours is amply sufficient.

Dr. Elbridge Cutler does not think it worth while to disinfect, the vitality of measles disappears and it practically disinfects itself. It is not necessary, though it may give a sense of security to the family.

The prevalent opinion on the Continent is that it is unnecessary. Dr. O. Heubner of Berlin (Mod. Clin. Med.) says: "Poison only develops in man, and not outside of the human organism, for in his surroundings it does not remain active very long, for even a residence in places in which measles patients have been previously present a few hours after careful ventilation confers no danger to susceptible individuals."

MEASLES IN SCHOOLS. In schools it is known that one case rarely produces an outbreak. The first case usually infects a few and often those near the infected child. The second crop of cases are those that infect the whole rooms.

Casper, in the Vienna *Clinical Weekly*, in 1898, noted that the first case infects the others from the ninth to thirteenth day after the sickening of the first child, and he proposed that schoolrooms should be closed for five days from ninth to thirteenth day, so that the second generation of cases should be excluded in the prodromal stage, and when school is opened the sick children would be out. Dr. Eberstaller of Gratz followed this method and found it very successful. In some cases a partial closure might be tried.

If there is not partial closure of the schoolroom then the school physician, teacher or nurse must carefully examine the children every day from the earliest to the latest period of incubation for the first symptoms that may point to measles,—the cough, suffusion of eyes, coryza, any indisposition. The buccal membrane should be examined for Koplik's spots. At any sign of illness the children should be sent home. Those sitting near the first case should be most carefully examined. Every effort should be made to limit the disease to as few cases as possible. If nothing is done the room will practically be closed on account of the large number of cases. It is in the schools that much valuable work can be done.

CONCLUSIONS. We know that measles is disease with a definite period of incubation.

It is spread in the pre-eruptive stage and during the period of eruption chiefly.

The infective principle is short-lived organism and does not live away from the sick person, if at all, more than a very short time.

The evidence of it being transmitted by fomites or intermediary persons is not sufficient for this to be considered as of practical importance.

There is no reason for disinfection. It is a needless expense and annoyance. Practical results can be accomplished as well by thorough airing of the room.

Reporting all cases should be insisted upon.

Isolation, as far as possible, should be tried.

Circulars should be sent to all cases with simple directions regarding the disease.

A limited amount of placarding may, in certain cases, be advisable.

VICE-PRESIDENT DURGIN. This paper is now open for discussion. Perhaps Dr. Chapin could tell us something about Providence.

DR. CHAPIN. Mr. Chairman, I was very much interested in this paper. It is certainly excellent, and the Doctor has shown us very conclusively that it is useless to disinfect after measles. I should very much like to see the experiment of closing schoolrooms when the first case appears, after the method adopted in Austria, tried officially in this country. It seems to me that that is one of the most hopeful things to be tried. As was shown in the paper, it is important to postpone attacks of measles from early to late childhood. It is in our kindergartens that measles most prevail, and if the outbreaks can be warded off for a year or two the mortality will be greatly lessened. The custom frequently is, in this country, to close schools after ten or twenty per cent of the children have the disease, but I am inclined to think that the logical way is to close them a week after the first child has the disease. I have not tried this in Providence, but I think it would be an excellent thing. I hope other health officers will try it.

Measles is the most discouraging disease that we have to deal with. As was shown in the paper, in New York they have been trying to treat it very much as we treat scarlet fever in New England. They have been at it six or seven years. I notice that their weekly bulletins now show that they are having a great deal of measles; I should judge more than they ever had before.

If any of you are interested in measles, I should advise you to get a report issued by the health officer of Aberdeen, Scotland, a few years ago. It contains a great deal of very valuable statistical matter, but the most interesting part is that which refers to the management of the disease. For about twenty years before 1902 they had, in Aberdeen, applied scarlet-fever methods to measles. They had isolated the cases in the family, kept them out of school, and disinfected. They had a little more measles during those twenty years than they had in the preceding twenty years, and they had just about the same amount of measles that they had in Edinburgh, Glasgow and other Scottish cities. According to the figures, comparing their measles cases with their birth rate during this period, I should judge that notwithstanding the stringent methods of isolation and disinfection adopted, about ninety per cent of their children, at one time or another, had measles. Preventive measures were not a great success in Aberdeen.

In regard to second attacks, what was said is undoubtedly so, that most of the alleged second attacks are not really such. But I remember seeing one case in Providence not long since. A young woman, twenty years old, was sick with measles, seriously sick; it was a typical case. The attending physician had seen her about ten years before when she had measles, and the case, he assured me, was a perfectly typical case, every symptom well developed. Unfortunately she died in the second attack. I am sure that such second attacks do sometimes occur.

MR. NEWCOMB. Is n't it the fact, Dr. Durgin, that under the law of 1907, which requires the reporting of cases, the seemingly greater number of them is made more apparent? That law of the State Legislature enumerated measles among those diseases dangerous to public health. We find in some of our principal cities — we do in Salem — a larger number of cases reported than used to be. That being the case, does n't it, in a measure, account for what might appear to be an increase in the number of cases?

VICE-PRESIDENT DURGIN. I can only say, in answer, that never before have I seen the disease increase so rapidly as since we doubled our activity in trying to prevent its spread in Boston. I think our number of new cases today is 109.

MR. COFFEY. Mr. Chairman, I was very much interested recently in reading a book that has just been published, giving the Lane lectures of Dr. John C. McVail. He is the county medical officer for a part of Scotland, and these lectures were delivered in San Francisco in August, 1906, at the Cooper Medical College. He gave statistics in reference to the disease in Scotland, near Edinburgh. In an epidemic they had in an urban district, of 1,401 cases, there were 119 deaths, with a mortality of 8.5. These deaths were distributed as follows: under 1 there was 9.6 per cent; 1 to 2, 19.7; 2 to 3, 10.2; 3 to 4, 4.9, and 4 to 5, 1.5. Between 5 and 10, 160 cases, 1.1 mortality; over 10, 39 cases and no deaths. His advice, and the inference that is to be drawn from his lecture, is that something ought to be done to tide over the early ages of childhood, as the writer of the paper has said, and that after five years of age the mortality is very light.

I believe that in one district in London they are now trying the experiment of closing the primary school as soon as the first case appears, that is, within a week after the first case appears they close the school, and they are conducting experiments along that line to see if they cannot control the disease until the children are over the susceptible age. I should judge, too, from the lecture, that a great many places in Scotland and England that had formerly required measles to be reported have discontinued that practice, discouraged and disheartened, as Dr. Durgin is, perhaps, judging by the remark he has made. They have ceased over there in a great many places requiring it to be reported, because of the fact that no effect seemed to be had in diminishing the number of cases or the mortality. Still they hope by this new method of closing a school on the appearance of the first case to accomplish good results. Dr. McVail tried it in one school in his district. By closing the school nine or ten days after the first case appeared he succeeded in keeping the number of cases down. When the first case appeared, several children were affected, ten or twelve I think he said, and by closing the school no other cases developed from that original case. But it must be said that the case was in a country district, where the children were scattered in isolated farmhouses, and it is not to be compared with our city conditions, where the children, if they are not together in school, are likely to be together in the streets or in adjoining yards, and perhaps it would not be as effective in city cases as it would be in the country.

Dr. McVail also gives figures for England and Wales for the forty years ending in 1887. The deaths from measles reached the enormous total of 367,602 in those forty years. This disease is supposed to be so trivial that most mothers want their children to have it when they are small and get it over with, yet in forty years there were 367,602 deaths, and of those only 31,728 were over five years of age, showing the enormous excess during the early years of the patients. Taking a decade, he gives the deaths between 1861 and 1870 as 391 per million of the population, in 1871 to 1880 as 378 per million, in the next decade as 406, and in the closing ten years, between 1891 and 1900, as 414 per million, showing that it was constantly increasing in those countries.

Dr. McVail does recommend that something should be done in reference to the matter, however, something in the way of isolation and of experimentation, and he advises that when the first case appears in a primary or kindergarten school the school should be closed within a week. But, as I have said before, it is perhaps a question whether the fact that they were excused from school would keep them very much more separated after they got home. Children mingle so closely at home and in city streets that perhaps a great deal of isolation would not be gained by excluding them from school, but certainly it might be tried, and something might be done to carry them along over those very susceptible years up to the age of five. If the cases were not diminished the mortality certainly would be, according to all the statistics.

DR. STACK. Are we allowed to permit children who have had the measles to go to school, according to the statutes of the Commonwealth?

VICE-PRESIDENT DURGIN. Measles is one of the diseases shut out by Act of the Legislature.

DR. CHASE. In Dr. Brough's excellent paper, and in the interesting remarks which have followed, there seems to be one omission. I would like to ask if Dr. Brough does not agree with me that, in view of the fact of the high mortality in measles among very young children, it would be wise to have day nurseries closed when there is an epidemic of measles in the neighborhood. The children in the nursery under six months of age would not be very susceptible, but there are a good many children over that age in the day nurseries who are very susceptible to measles. Would not closing of such nurseries, therefore, be a wise precaution?

DR. BROUGH. It would be a very good idea.

MR. NEWCOMB. Is n't there also another point in the matter? Measles seems to be a disease which many a good mother regards as one she is able to take care of herself, without a physician. There is a slight handicap about reporting. Is n't there another? I mean with regard to the law of 1907, which makes it mandatory on the part of the physicians to report. Would n't it be a good plan if our physicians reported a little more promptly, instead of letting quite a few cases go too long?

VICE-PRESIDENT DURGIN. In answer to Mr. Newcomb's question, I should say there can be no doubt about the propriety, and there is no doubt as to the demand upon physicians to report all infectious diseases of this type, that the parents or guardians should have quick notice of the fact, that the patient must be isolated and kept so until lawfully released, and also such instructions as may not have been given by the attending physician. I should say that the majority of cases of measles are not seen by a physician at all.

Are there any other remarks to be made? Dr. Shea, have you anything to say?

DR. SHEA. Mr. Chairman, Dr. Brough has covered the subject so well in the way our department is endeavoring to handle this question, that there is not much left to be said. I am a great believer in popular education. The conditions, if we go back fifteen or twenty years, existing as regards the handling of scarlet fever and diphtheria, give me great hope that we may be able to do something with this question. The mere fact that a case is isolated, and the mere fact that the patient is quarantined, is important. The placarding of the house in itself I think is a great help in handling this question of measles. You notify the public, and you notify the immediate neighborhood. It is going to take a long time to see any results, but we have made a beginning. We are going to visit these cases, and if we find a child that is suffering with pneumonia, and that child is not receiving proper treatment, it is going to be sent to the hospital. I think hospital treatment is to have a great influence on the death rate in years to come, especially of this city. With the opening of the new measles pavilion in the fall at the South Department, and in addition fifty more beds that the Homœopathic Hospital will have at the Corey Hill hospital, we hope, in a few years, to show a diminished mortality for this disease. I think the great mortality in this disease, especially in the young, the children of one or two years of age, means neglect, means the lack of nursing and the lack of medical care.

As regards attendance at the schools, I think we have made a great advance. Heretofore, within a year or two, since the passage of the present law, whole families of children were excluded from school. If the youngest child in a family of seven or eight children came down with measles, the whole family was excluded from school, even when all the other children were protected by a previous attack. Now, when the case is investigated, the proper certificate is made by our local school inspector, and those other children are allowed to return to school. That in itself is a great advantage, if you consider the hundreds of days that are lost in the school year by different children in the city.

I have great hope that we are going to do something with this question of measles, and my faith is on the results that we have accomplished in scarlet fever and diphtheria. True, in diphtheria, we have had antitoxin as our great aid and strength, but scarlet fever is still showing and has shown good results as regards mortality. I think, as Dr. Brough has said, that this question must be met with, and the people must be educated, and the only people to educate the public are the health departments.

DR. VIETOR. Mr. President, I was hoping one of the speakers would allude to the fact that has been impressed upon me, that a large element in meeting this problem is the element of the lay mind, particularly the mind of the mother. There is a very general impression, among the mothers of the community, that measles is a disease of no import. A second impression, which is equally strong, is that it is of advantage to have the children all exposed to the disease and have the disease early, so as to have it over with. We have all had the personal experience of having mothers deliberately try to have their children take the infection. It occurs to me that a great deal could be done in a very simple way, by the health boards issuing a circular letter to the mothers and the teachers. I think they would be, next to the physicians, the great bodies of the people to meet. The mothers and the teachers have received their ideas from the physicians. The physician's standpoint has changed, or has become more enlightened. Now the question is, how to pass the new medical idea to the mothers and the teachers. It seems to me that a brief circular, embodying the conclusions expressed in the paper read here this afternoon, could readily be distributed directly by the health boards as a circular of information, and indirectly through the public press.

DR. ROSE. I would like to ask in what manner patients generally die from measles, that is, what intercurrent disease carries them off?

DR. BROUGH. Chiefly bronchial pneumonia. That is the most common cause assigned. There are a great many more deaths in Boston from measles than are actually reported, because many children that are suffering from measles die afterwards from bronchial pneumonia, and bronchial pneumonia is given as the principal cause of death, with, perhaps, measles as the secondary cause. Such deaths often go into the records simply as deaths from bronchial pneumonia, and others are reported as bronchial pneumonia without giving the cause of death. So if we had actually in the State of Massachusetts all the deaths actually due to measles, they would be very much higher than they are at present.

PROFESSOR SEDGWICK. There is one point that I hope we shall not lose sight of, and that is that although the biology of this particular disease indicates that the germ, whatever it is, is of short life, biology shows that in other diseases the germs are sometimes of long life; so that while it is well, perhaps, to neglect disinfection for this short-lived germ disease, there are others, like typhoid, where disinfection has never yet been properly brought in. If we could give the energy now spent on disinfecting for measles to disinfecting for typhoid, which has a hardy germ, a germ which does live rather long in the environment, we should, I think, do well. It is rather an odd fact that we seem to be disinfecting for the wrong diseases. In the case of yellow fever, for example, we have given up all disinfection, and rightly, because we now understand better the method of transmission; but in the case of typhoid we have not yet begun to disinfect as thoroughly as we ought to, and to isolate the patient, or treat the patient as a contagious patient, as much as we ought to. So that if we have been laying the emphasis in the wrong place, the duty now upon us is evidently to put it in the right place.

DR. SHEA. I wish to say that our department sends a circular to the head of each family where measles has been reported. That is sent daily. In fact, as soon as the report of the case is received the circular is sent to the parent or the guardian of the child, with full directions about the care and isolation of the patient.

DR. BROUGH. In regard to the transmission of diseases by fomites, I have here a letter that is addressed to Dr. Durgin from Dr. A. H. Doty, who is the health officer of the port of New York. He states in part as follows:

> From my own experience and that of others who have also given this matter careful and practical consideration, I am satisfied that the clothing of well persons, baggage, cargoes, money, etc., transmit disease only in rare instances; that persons and not things constitute the ordinary medium of infection. I believe that mild, ambulant or irregular cases constitute one of the most dangerous factors in the transmission of infectious disease, because they are commonly overlooked and are responsible for outbreaks of disease, the origin of which is unknown, but are usually attributed to alleged infected clothing, etc. In making this statement I do not refer to the clothing actually worn by the sick.
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> It has been stated as an argument against this belief that the large increase in the number of cases of measles, scarlatina and diphtheria, which generally follow the opening of schools in the fall, is due principally to the transmission of these diseases by the clothing of well children in whose homes ininfectious disease exists or has existed. Some years ago the Department of Health of New York City established a school corps, consisting of physicians, who daily visit the public schools. Very soon after the beginning of their work indisputable evidence was presented to show that the increase in the number of cases referred to was due to the presence of children who were either desquamating from measles or scarlatina or were infected with these diseases, and also diphtheria in a mild or unrecognized form. These cases are now daily removed from schools.
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> These questions must be determined by practical experience and not by theory. Cases which on superficial investigation may appear to be trans-

> mitted by clothing, etc., are upon exhaustive investigation commonly found to be caused by the presence of other cases.
>
> The belief that disease is transmitted by persons and not things not only does not mean a relaxation in our efforts to protect the public health, but greatly increases the protection by demanding that an exhaustive inspection be made to detect the presence of cases responsible for outbreaks of disease.

VICE-PRESIDENT DURGIN. I would state that the letter just read is from a physician who was chief in the infectious disease division of the Health Department of New York for over twenty years.

The next paper on the program is on "The Function of Health Boards in the Control of Tuberculosis," by Dr. Edward O. Otis of Boston.

THE FUNCTION OF HEALTH BOARDS IN THE CONTROL OF TUBERCULOSIS

By **EDWARD O. OTIS, M.D.**
Boston

It is obviously impossible to suggest a course of action regarding the control of tuberculosis which is applicable, in all its details at least, to all boards of health. The conditions vary so greatly in different communities, depending upon the size of the community, a town, or a large or small city; the character and intelligence of the community; the power, means and equipment accorded the boards, and their freedom from political interference; and, finally, the character of the board itself as to skill, training and initiative. One can, therefore, only discuss the question upon broad principles and the application and modifications must be made according to local conditions.

The efficiency of any board of health must ultimately largely depend upon the intelligence and demands of the community which it serves. If the people want tuberculosis controlled, they will demand the creation of such a health board as will do it, or their share of it. On the other hand, the Board of Health must often take the initiative and show the people, by example and precept, the necessity of protecting themselves against this preventable disease, which is a menace to every member of the community. Education regarding the main facts of tuberculosis then falls within the legitimate province of the board, and often must be preliminary to more active measures.

The essential facts upon which must be based the control of tuberculosis seem now to be at hand. We know the cause, the micro-organism which is always present, the methods of communication, principally through the sputum of a tuberculous individual; the conditions of personal and environmental hygiene which favor the development of the infecting germ, such as unwholesome and crowded living, the abuse of alcohol, unhealthy workshop conditions, etc. We know the stigmata which suggest an infection by the tubercle bacillus, the influence of family predisposition, and the effective means of destroying the bacillus.

In this State the local boards of health are greatly aided by the provisions of the State itself. Registration is obligatory, as in the acute contagious diseases; promiscuous spitting is unlawful; suspected sputum is examined free by the State Board; instruction upon the prevention of tuberculosis is required in the public schools; and the State inspectors, working under the State Board of Health, are supposed to aid the local boards in determining, at least in a general way, the prevalence of tuberculosis in their respective districts and in disseminating knowledge "as to the best methods of prevention."

The first and fundamental step in any attempt to control the disease is registration through notification by physicians and hospitals and by whatever other means knowledge of the existence of cases can be obtained and *where* they exist. When the case is once discovered, it should never pass out of the knowledge or supervision of the Board of Health until death occurs, removal to another city or town, or the case has been proved to have been arrested.

A street and house card index can be kept, indicating the locality of the cases, or this can be done by means of pins or dots upon a map. Thus it can be seen at once what localities, tenements or houses show excessive cases, and, consequently, especial control methods can be employed in these localities, tenements or houses.

If we are to effectually control tuberculosis in the congested districts of a city, something *more* must be done than simply to visit the reported cases. Whenever many and successive cases are found to exist in such sections, I believe the only thorough method to pursue is to make a house to house and tenement to tenement investigation, and cause, or urge to be examined, every inmate; which I believe can be effected by a tactful investigator, aided by the visiting and school nurses and the free dispensaries. At the same time the hygienic conditions of the tenements can be noted, which will yield the health board valuable information.

That such a suggestion is not chimerical, an investigation of this kind, now being successfully prosecuted in Wall Street at the North End of this city, under the auspices of the Boston Tuberculosis Association, proves. Similar street and house to house investigations have been made in Berlin and Paris, and, I dare say, other cities. I have only to refer to the recent striking "congestion" exhibition in New York City, where the relation of overcrowding in unhealthy tenements to tuberculosis was graphically shown. If we would control tuberculosis in the tenements, we must control the tenements and the conditions of life in them. It is absolutely essential, in my opinion, that, when once discovered, the dangerous consumptive should be constantly and always kept under observation, so that the dangers of infection, by removal from one tenement to another, may be avoided by prompt and efficient disinfection of the vacated abode before occupancy is again permitted, and that the other members of the family can be kept under observation.

Secondly, and as a necessary sequel to registration, are supervision and instruction of the consumptive at his home, unless the case is such that removal is required. This (supervision and instruction) can best be attained, in my opinion, by the visiting nurse rather than by an agent or inspector.

In small towns where there are not cases enough to occupy the entire time of such a nurse, it may be possible to make some arrangement with a private charitable association whereby a nurse can serve both agencies and so diminish the expense to both. In my experience, I find that the visiting nurse, if wisely selected, is able to gain the confidence of the consumptive and his family, and by patience, tact and repeated visits to keep him up to the demands of the tuberculosis hygiene.

It is understood that I have been referring to cases of tuberculosis as found among the poor and ignorant, whereas all cases should be reported. Those among the intelligent and better classes of the community can be left to the care and supervision of the conscientious physician.

It is, in my opinion, a very inadequate conception of the duty of the Board of Health to make a *single* visit only upon a consumptive, provided any visit at all is considered necessary. He should be kept under constant observation by repeated visits, as I have before said, and a record should be made of the conditions found on each visit. Incidentally the visiting nurse or agent should urge all the children or other members of the household to report to the dispensary, or to some reliable physician, for an examination of their lungs, for it is not an infrequent occurrence that other unsuspected cases have been discovered in the same household by this precaution.

Thirdly, disinfection on death, removal and at the time the case is first discovered of *all* portions of the house which have been occupied by the patient; and it would appear that the owner of the property should pay for such disinfection, and he could be made to do this by not permitting him to let the tenement again until it was done, as is the practice in certain health resorts.

It is hardly within the scope of this paper to consider the best and most effective methods of disinfection, but, in brief, it may be said that the method which meets with general approval is a thorough fumigation with formaldehyde gas, followed by scrubbing the painted woodwork with a solution of hot soda and repainting, repapering, or recalcimining the walls. All hangings, bedding, mattresses, pillows and rugs to be disinfected with steam or exposed to the air and sunlight for several days, and all articles of little value to be burned.

Fourthly, another duty of the Board of Health is the removal and isolation of cases who cannot or will not conform to the regulations of the tuberculosis hygiene. Any Board of Health in this State, I believe, possesses full power to do this, tuberculosis being now legally a contagious disease, when, in their judgment or that of their agent, the case is a menace to the other members of the household. The difficulty has been, and still is, that there are inadequate facilities for isolating such cases. This difficulty will, however, be largely obviated in the future in this State by the three consumptive hospitals to be erected in different parts of the State for the reception of advanced cases. At present there are available the almshouse, a few private consumptive homes, or the special provisions made by some cities or towns, as in Brookline. In the report of the Relief Committee of the Committee on the Prevention of Tuberculosis of the New York Charity Organization Society the conclusion is reached that in New York City, and the same is applicable to the congested tenement-house portion of any city, relief in the homes of consumptives in a far advanced stage is a dangerous substitute for isolation in hospitals.

The problem of the control of tuberculosis, however, is only half solved when the reported cases are controlled and provided for; for it is a fact of common observation that only, as a rule, are the more or less advanced cases brought to the attention of the Board of Health. What of the earlier cases, those which have become "open," and which have tubercle bacilli bearing expectoration; and the still earlier ones, the "closed" cases without such expectoration, but which will shortly become open if allowed to go on uncared for?

As Grancher truly says, an early diagnosis, a genuine early diagnosis, so important for the patient himself, is at least as important to the community at large, for, treated and arrested at this epoch, tuberculosis ceases to be contagious. To arrest the fire at its inception entails less loss and expense upon the community than attempts to control it when it is well under way.

The solution of this problem rests, in the first place, upon the medical profession; they must exercise greater eagerness, care and skill in making an early diagnosis, a diagnosis made in most cases before tubercle bacilli appear in the sputum, a diagnosis made from the general symptoms and auscultation, or, in doubtful cases, by the tuberculin test, a test now made easy and apparently fairly accurate by the ophthalmo-tuberculin method. In the second place, some provision should be made for the free examination of suspects, a free tuberculosis dispensary, either directly under the direction and support of the Board of Health or some other authoritative body. Many cities already do this, and every city should afford opportunity for a free, prompt and satisfactory diagnosis. A free tuberculosis clinic held one or more days a week, and at least one evening could, I believe, be instituted in any city or large town with comparatively slight expense, and by proper advertising the working people could be urged to present themselves for examination whether or not they think they have tuberculosis. One day, preferably Saturday, could be devoted to the examination of children.

In order to detect these early cases and put them under treatment before they become open and hence dangerous ones, and in order to discover other more advanced cases, who may never have realized that they are suffering from tuberculosis, free and ample facilities must be afforded the poor and working classes for an authoritative examination in some such way as I have suggested. Of course this can be accomplished by private initiative under the auspices of tuberculosis associations, etc., but if not done in this way it seems to me to be a legitimate and necessary field for the Board of Health. In New York City the Health Department has its dispensary for this purpose; while in Boston this is done by the city, but under the direction of the Municipal Consumptive Hospital. The visiting nurse should attend the clinics and subsequently visit the homes of those found to be suffering from the disease. Free distribution of sputum receptacles, Japanese paper napkins, paper bags, etc., should also be made at the tuberculosis clinics and by the visiting nurse at the home.

In the medical inspection of schools a periodic examination of all the children would seem now to be in line with modern tuberculosis control work. If, as is now the case in some schools, an examination of the eyes, ears and teeth of school children is regarded as essential, equally so, it seems to me, is an examination of their lungs when one considers the prevalence and frequency of tuberculosis.

With regard to the conveyance of tuberculosis through milk containing bovine tubercle bacilli, it still remains to be proved that this occurs to any great extent, and up to the present time Koch's statement of 1901, made in London, that the dangers from bovine tuberculosis could be practically disregarded in the tuberculosis warfare has not been disproved. That the possibility exists, however, we know from proved facts, and hence some method of milk inspection and supervision, however it is done, is obligatory upon the Board of Health; of the methods of doing this it hardly falls within the province of this paper to discuss.

That, however, tuberculosis is frequently produced by food contaminated with tubercle bacilli seems certain, and many authorities, as we know, declare that the ingestion form of infection is the principal one. Whatever opinion we may hold with regard to this, the method of prevention is one and the same, namely, the destruction of the sputum, cleanliness in the preparation of food, and the prohibition of promiscuous spitting. If we can control the tubercle bacilli sputum output, we can control and prevent the communication of tuberculosis, whether it is communicated by means of ingestion or by inspiration.

Finally, the education of the community. In some cities and towns this is done by private initiative, such as tuberculosis associations; in others, the Board of Health must undertake it and teach the public the simple facts of tuberculosis and its prevention. They must create a constituency who, by their intelligent conception of the problem, will coöperate with the board in its efforts to control the disease.

Such educational work is, in some States, carried on by the State Board of Health, either alone or in coöperation with the local boards. A notable example of this is the excellent and extensive work of the Illinois State Board, in its widely circulated and admirable tuberculosis literature. In other States a special tuberculosis commission takes charge of the educational work; while in others it is done by the local boards, or must be, if done at all.

The methods are familiar to you: tuberculosis exhibitions with lectures; lantern-slide lectures, particularly in schools; and the distribution of literature. Since in this State the law now requires that instruction upon tuberculosis and its prevention shall be given in the public schools, the boards of health might naturally be looked to to furnish material for such instruction.

In many States and almost all cities anti-spitting laws or ordinances exist, but in none, to my knowledge, are they, to any great extent, enforced. It is a very difficult thing to do it. Local boards of health can aid in the matter by coöperating with the executive department of the city, and by instructing the people regarding the dangers of promiscuous spitting, by means of placards in public resorts, railroad stations, public vehicles, etc., and, when permitted by the owners, in factories, stores and workshops. In my opinion, cuspidors ought to be placed in all public places with the notice, "Spit here," placed over them. I believe nothing would do so much towards abating the promiscuous spitting nuisance as this step, for in this climate the average man will spit, and the solution of the problem is to make it possible for him to spit in safety to himself and others. At the same time it should be insisted upon that the cuspidors should be frequently and thoroughly cleaned and always kept partially filled with water or some disinfectant fluid.

However zealous, alert and skillful the Board of Health may be, they must have the coöperation of the medical profession and of the public if they are to be successful in the control of tuberculosis. The professional and moral support of the medical profession is most essential, for the physicians are the ones who influence and guide the public upon matters of health; only with their aid can the boards of health do their best work and obtain from the people their support, and, from the municipality, adequate appropriation, for the prevention of disease is expensive in the first cost, but it is as nothing in comparison with the ultimate economic gain.

The supreme test of any and all measures in the control of preventable disease is a steady decline in the death rate from these diseases; and when this does not occur it is an indictment of the authorities who have the health of the community in their keeping, provided they have an intelligent conception of their duties and are allowed a free hand in executing them. The notable diminution of tuberculosis in New York City, for example, within a comparatively few years, indicates that the Health Department of that city has successfully met this test with regard to this disease.

VICE-PRESIDENT DURGIN. This paper is now open for discussion.

DR. ROSE. Does the State Board of Health examine sputum sent in free?

VICE-PRESIDENT DURGIN. I will state, in answer to your question, that the Boston Board of Health, through its laboratory, examines all sputum sent in for examination. Perhaps Mr. Rickards can answer the question as to examination of the sputum, in a few words, better than I can.

MR. RICKARDS. I understand that the State makes examination of sputa free, for any city or town which has not a laboratory of its own; but a great many cities and towns now have laboratories. Boston makes the examination free, as do, to my knowledge, Brookline, Cambridge, Worcester, Springfield, Holyoke, Brockton, Somerville, Newton and probably some other cities and towns. Where the city or town does not make it free, then the State will make an examination for them..

DR. ROSE. Will you tell us how to proceed to get the examination made? How shall we send the sputum?

MR. RICKARDS. The State has an outfit which you can obtain. Usually they have some station within the city or town, but if they have not you can get it from the State Board of Health Laboratory.

VICE-PRESIDENT DURGIN. In Boston there are forty-nine places in which such city outfits are placed for the accommodation of physicians.

The question is still open for discussion. If there is nothing further to be said upon this important and interesting paper, we will pass to the next subject for consideration, the report of the Committee on Sex Hygiene.

DR. PALMER. In behalf of the committee appointed at the last meeting of this Association, I wish to say by way of preface that we realize fully the very great difficulty and importance of the work that was placed upon us. We also have fully realized the delicacy of the question, and how it can best be handled, but we have also realized that it was time that something definite was done, and that some work was infinitely better than no work. We feel, too, that the question can be largely and perhaps best approached from the side of public instruction. I would further say that we have given the subject a great deal of time and thought and hard work, and I present to you, for the committee, this report.

Report of the Committee on Sex Hygiene to the Massachusetts Association of Boards of Health

Mr. President and Fellow Members: In view of the facts that syphilis and gonorrhœa are highly contagious and therefore preventable diseases; that they are dangerous to the public health and welfare; that a large percentage of the people at some time contract these diseases; that they make men and women sterile; that they fill wards of hospitals and the homes of the people with chronic invalids; that they deny to the child its fundamental right to be well born; that one of these diseases causes a large part of that terrible affliction, blindness; that much of this great evil is due to ignorance and support of ignorance by the foolish and prudish notion that the enlightenment of the public as to sex hygiene is improper, unwise and unsafe, your committee unanimously makes the following recommendations:

1. That this Association request the State Board of Health to include syphilis and gonorrhœa in the list of diseases dangerous to the public health, and that physicians and householders be required (as in the case of any other

notifiable disease) to report cases of syphilis and gonorrhœa to the local board of health with the privilege, if desired, of giving only the initials, the address and apparent age of the patient. The initials are important to prevent the registration of the same case more than once. The object is that the Board may have some knowledge of the extent of the problem and may send to the physician for the patient a circular of information about these diseases and means of controlling them and preventing their becoming an even greater menace to public health.

2. That this Association request that the State Board of Health send to all local boards of health for distribution, by physicians and hospital superintendents, to persons having syphilis or gonorrhœa, a printed leaflet or card similar to that herewith presented setting forth the source, nature and means of control of these diseases.

3. That this Association request the State Board of Registration in Medicine to include prevention and cure of syphilis and gonorrhœa among the subjects of its examinations.

4. That this Association request that free bacteriological examinations be made in all board of health laboratories of smears from the eyes of infants suspected of having gonorrhœal ophthalmia and from genito-urinary organs of persons believed to be suffering from or cured of gonorrhœa.*

5. That this Association request that every general hospital make provision for admitting cases of both of these diseases to its wards.

6. That this Association urge upon the school authorities judicious instruction of grammar, high-school and college students in sex hygiene.

If these recommendations are approved by this Association, we suggest that the committee be continued until the next annual meeting. To further these and other objects within its scope and to enable the committee to print and distribute, through proper channels, educational circulars on sex hygiene, we ask that a suitable appropriation be made.

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* Such examinations are now made free by the Bacteriological Laboratories of the Boston, Cambridge, Brookline and Somerville Boards of Health.—*Ed.*

Respectfully submitted,

LEWIS N. PALMER, M.D., *Chairman*
H. LINCOLN CHASE, M.D.,
GARDINER T. SWARTS, M.D.,
WALTER E. KRUESI, B.S., *Secretary,*
Committee on Sex Hygiene.

I would say, Mr. President, that I have here some circulars of information, such as seem to your committee to be wise.* If there is any desire to hear them I will read them, but to save time it perhaps will not be wise to read them. I want further to say that we have made several recommendations, hoping to get the approval, or at least the coöperation, of the State Board to give this work a proper standing. There are now many societies working along this line from different standpoints and approaches. I think if this Association, backed by the State Board of Health, will give this subject a proper backing, very much can be done. We are not dealing with a new subject. Something like half a dozen States have already taken action on this subject, and have distributed circulars similar to the ones that we have prepared.

VICE-PRESIDENT DURGIN. Gentlemen, this important report of the committee is before you. What is your pleasure?

PROFESSOR SEDGWICK. Mr. President, I was unfortunately absent from the meeting when this subject was taken up, so that it comes to me about at this time as an almost entirely new matter, but I should be sorry to see it go through without having given to it my commendation and assent, because I feel strongly that it is a matter of grave importance to the public health and to the public welfare. I have heard with interest of the work of the committee, and have looked over their report with some care, as well as over the draft of one or more of the circulars which they have prepared. While these latter, perhaps, deserve still further consideration, because when we move we want to be sure that we are moving exactly right in every way and with every statement put as strongly and yet as quietly as it can be, I do feel that the committee has done excellent work, and that it is our duty, as a public health association, to take up the work along the lines that they have indicated. It is, I suppose, obvious that State and local boards of health will always find it difficult to make the complete and original movement in matters of this kind, because they represent all branches of members of the community, and there is naturally a difference of opinion as to the wisdom of attacking a subject of this kind. For my own part, I cannot see that any such objection, however valid when applied to official boards of health, is valid when applied to an association like this, and I do believe that the time has come when this Association should accept the duty of leadership in this matter in this State, and when it should take up the subject and put itself on record as believing that the time has come to do something about it. This is a case where ignorance is not bliss, and it seems to me that the corollary also follows, that, therefore, it is not folly to be wise. It does seem to me that, not only through boards of health and their official representatives, such as we have here, but through persons interested in public health and sanitation and through schools, work ought to be done and information disseminated. Any one who has attacked, for example, the school end of the proposition knows how difficult a matter it is. A schoolbook which should deal with these matters frankly and in a dignified way would still meet today with very little acceptance. It is a difficulty which comes before every writer of school text-books. But the time will come when there will be information of the kind in the leading and best text-books for school use, and that time will be hastened if associations like this put themselves on record in favor of the movement. I don't know what step ought to be taken in order to give efficacy to the action of this committee, which has been so ably presented in its report, by the chairman. But I see at the end of the report the statement, that if these recommendations are approved by this Association the committee suggest that they be continued, at least until the next annual meeting. And that to further these and other objects within its scope, and to enable the committee to print and distribute through proper channels educational circulars on sex hygiene, they ask that a suitable appropriation be made. If, then, Mr. Chairman, it is in order, I should like to move, first, that this report be accepted and adopted; and, secondly, that the committee be requested to continue in its work until the next annual meeting at least; and, thirdly, that an appropriation be made to enable them to carry on their work.

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* These circulars will be printed in full in a later issue.—*Ed.*

The motion was seconded.

VICE-PRESIDENT DURGIN. It is moved and seconded that the report of the committee be accepted and adopted, and that said committee be requested to continue its work until some future meeting. Is there anything to be said upon this motion?

The motion was adopted.

VICE-PRESIDENT DURGIN. I would like to ask for a vote of thanks to our visitor, Dr. Otis, for his able and interesting paper on tuberculosis.

The motion was adopted unanimously.

DR. CHASE. In regard to an appropriation for the carrying out of this work, there will be some expense for printing, typewriting, stationery and postage. I would like to make a motion that, after reference to the Executive Committee, if that be necessary before an appropriation of money can be made, such sum may be appropriated as may seem wise to the Executive Committee in conference with the Committee on Sex Hygiene. Is that motion in order, Mr. Chairman?

VICE-PRESIDENT DURGIN. I have not a copy of the Constitution and By-Laws before me, but my impression is that those appropriations have to be made by the Executive Committee.

MR. COFFEY. Mr. Chairman, the Committee on Scientific Papers have charge of that. That committee consists of the First Vice-President and two other active members.

DR. CHASE. Then, of course, that answers my question, Mr. Chairman.

VICE-PRESIDENT DURGIN. I see no harm in taking the expression of the Association upon that question. How much of an appropriation is needed?

DR. CHASE. We think that about $250 will be necessary. We intend to expend the money within the State, and not send circulars outside the State in any quantity. Samples may be sent.

VICE-PRESIDENT DURGIN. The motion is made and seconded that the proper committee —

PROFESSOR SEDGWICK. May I say, subject to the approval of the Executive Committee?

VICE-PRESIDENT DURGIN. It would be a recommendation from the Association. The motion is made and seconded that the Association recommends an appropriation of $250 to be expended by the Committee on Sex Hygiene. Those in favor of this motion —

DR. PALMER. Before that motion is put I would like to have the members understand the situation. Some of them may wonder if we have got any money to do it with. I will say that we took the trouble to look up the last report of the Treasurer, and we found that there is something like $1,500 in the treasury, so that we have the money to use if it is so voted.

The motion was adopted.

VICE-PRESIDENT DURGIN. The next business is the proposed amendment to the Constitution, changing the present name of the society to The Massachusetts Public Health Association. Is there anything to be said upon the proposed amendment?

MR. COFFEY. Mr. Chairman, when this matter was first proposed I had not given it much attention, and consequently it made very little impression upon me, but the more I have thought of it since, the more deeply I have become impressed with the idea and the conviction that we had better let well enough alone. The present name of the Association conveys clearly and distinctly the objects and purposes of the Association. It tells what it is, without any explanation whatever; it is an association of the boards of health of the State. The purpose of the organization at its inception was to bring together the members of the various boards of health throughout the State for mutual intercourse and discussion. There has been no desire on the part of the members of the various boards to exclude persons who are interested in sanitary matters from the Association; on the contrary, the reverse has been true, and we have been only too glad to have any and all who are interested in the subject join the Association; and the very fact, too, that some of the best men and women of the State, interested in such subjects, have joined the Association, shows pretty conclusively that the name has had no deterrent effect in preventing the Association from growing and from carrying out the purposes for which it was designed when it was started.

I have the honor of having started this Association. My desire and purpose was to get together, as I said at the start, the members of the various boards of health, particularly those of the smaller cities and towns of the State, and because too it came to me very strongly early in the beginning of my work when I found it necessary a great many times to go to the Boston Board of Health and get, from their greater experience and greater knowledge, information that I needed. And I want to say here and now that they never failed me, they were always ready and willing to give me that information. In that way the thought struck me that it would be a good thing if the various boards of health could get together, and the Association was formed. At my request a notice was sent out by the Chairman of our Board in Worcester, and the first meeting was held a short time subsequently. Our object was to get into this organization members of boards of health, from the smaller cities and towns of the State particularly, and from the older cities and larger cities to get the benefit of their larger and wider experience, and I think the growth and the success of the Association have shown that the name, as I said once before, has had no deterrent effect. We have grown. When a new member of a board of health has been appointed in some small city or town, and he has been asked by his associate to join the Association, and he has replied, "What is it?" and he has been told, "It is the association of the boards of health of the State," there has been no other explanation needed. He joins, if he has any desire at all. But if you should say, "It is the Massachusetts Public Health Association," you have got to explain what the Massachusetts Public Health Association is. You don't need to explain the other; it explains itself. I have no objection to calling the magazine what you may see fit to call it, but I think the present name more clearly defines and expresses what this Association is when the title, The Massachusetts Association of Boards of Health, is given, than the proposed title, The Massachusetts Public Health Association.

MR. RICKARDS. I desire to state that while I have had nothing whatever to do with the introduction of this motion, except, at the request of the President and, purely as a matter of form, to put it before the Association in a constitutional way, after thinking the matter over I am in favor of the change. The new name is certainly a little less of a mouthful than the old one. If any of you have had occasion to use the old name as many times as I have, and perhaps over the telephone, you will find it is rather an awkward thing to say. There is another argument for the new name, and that is that it brings it in line with the national organization, the American Public Health Association. The local associations sooner or later should have a closer affiliation with the national organization. This Association, together with the various schools for health officers and other associations of like character, may in the future, perhaps, be associated with the national organization for effective work, and it seems to me that this name would be a start in the right direction.

VICE–PRESIDENT DURGIN. Are you ready for the question? Those in favor of the proposed amendment will say aye, contrary minded no.

A *viva voce* vote was taken.

VICE-PRESIDENT DURGIN. The Chair is inclined to think the ayes have it. Being in doubt we had better have a count.

A hand vote resulted, 16 yes, 20 no.

VICE-PRESIDENT DURGIN. Sixteen for and twenty against, and the amendment is lost.

Is there any other business to come before the meeting?

DR. ROSE. The question as to how to get sputum tested for tuberculosis bacilli at the State House has been answered in the following note:

> May I offer the information that a mail or personal request to the State Board of Health, State House, Boston, will result in your being sent as many sputum boxes as you desire? When you return these to the Board they will make a prompt examination of the sample, and send you a sealed report as to the finding. Walter E. Kruesi.

VICE-PRESIDENT DURGIN. Is there any other business to come before the meeting? If not, a motion to adjourn will be in order.

On motion, the meeting adjourned.

PERSONAL HYGIENE

By PERCY G. STILES, Ph.D.
Instructor in Physiology, Massachusetts Institute of Technology

THE USEFULNESS OF CARBON DIOXIDE. We have recently called attention to the unexpected value of muscular waste products as stimulants. Since Dr. Lee published his interesting results, further observations of a related kind have been reported by Dr. Henderson of the Yale Medical School.* Carbon dioxide is the chief oxidation product of animal metabolism. An average quantity of 800 grams is excreted daily through the lungs of a man. It has always been natural to regard this gas as something which the organism seeks to get rid of, and to assume that the more freely it is discharged the better will be the condition of the tissues. But the remarkably large quantity in the arterial blood has always had to be reckoned with. The usual amount is not far from 40 c.c. CO_2 in 100 c.c. of blood. It has gradually come to be recognized that it is as bad to lower the percentage of carbon dioxide in the blood as it is to raise it. Mosso, the Italian physiologist, has noted this, and has given the name of "Acapnia" to the condition of lowered carbon dioxide content. The word means, literally, "smokelessness." It can be produced in a certain degree by voluntarily deepening the respiration, but the tendency to desist from the attempt soon becomes overpowering. A state of apnœa (suspended breathing) tends to ensue, and so the normal relation between the gases in the blood is re-established. Haldane has shown how very sensitive the respiratory center is to changes in the carbon dioxide content of the blood.

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* American Journal of Physiology, 1908, Vol. XXI, p. 126.

Dr. Henderson's studies have especial relation to the question of surgical shock. This is a threatening condition of collapse in which the weak, rapid heart and insufficient circulation are the obvious features. It has been natural to refer it to nervous causes. In the light of the latest observations it appears to have a simple chemical origin in acapnia. The characteristics of shock are readily produced by artificial respiration in dogs and can be counteracted by restricting the air supply. Thus the very measures which might be expected to give relief seem calculated to make matters worse. Acapnia may be produced during anæsthesia by the deep breathing which goes on while the general metabolism is at a low level, and if the tissues are freely exposed in an operation we have an additional channel by which carbon dioxide will escape. This last factor may be more important than would appear at first, for we must remember that while in the lungs we have the blood in the presence of alveolar air containing about five per cent of CO_2, the blood in the surface vessels of an exposed organ is in contact with the atmospheric air with no such back pressure of the gas.

The author refers to the acute inferences of Mosso in regard to a possible connection between acapnia and "mountain sickness." Such a connection is made to appear more probable by Dr. Henderson's experiments. In rarefied air there is difficulty in getting the required amount of oxygen and deepened breathing is necessary. There is no corresponding difficulty in discharging carbon dioxide, which passes off at least as freely as at the sea level. Under such conditions acapnia must be produced and the pressing need for oxygen forbids the apnœa which would naturally follow. Various disturbances may come from this abnormal composition of the blood, the quick, inefficient heart-beat being prominent here as in shock. It is said that surgical shock is more frequent at high altitudes, in Colorado for instance, than elsewhere.

Physiologists have long since observed that carbon dioxide is stimulating to the intestinal wall, improving its tone and promoting peristalsis. Its action on the blood vessels is probably similar. Its effect on the heart is less simple, for it seems to favor diastole and systole in turn, while in its relative absence (acapnia) the heart relaxes incompletely and is rendered ineffective more by this fault than by any failure to contract. It remains to be seen how far the effects are direct and how far they are brought about through the nerve centers. Dr. Henderson has done well to open our eyes to the vital value of a compound which we regard as a typical waste product, and the additional papers which he promises will be anticipated with much curiosity.

MUNICIPAL SANITATION

By **CHARLES V. CHAPIN, M.D.**
Superintendent of Health, Providence, R.I.

CONTROL OF THE MILK SUPPLY. The English cities of Liverpool and Manchester are doing much to improve their milk supplies. Among other things frequent tests are made of milk to determine the presence of tubercle bacilli, and for this purpose inoculation tests are made upon guinea pigs. In Liverpool * 209 samples from dairies in the city were taken, and of these 3 showed the presence of the bacilli, while of 321 samples of country milk, 22 were infected. Great effort has been made to free the city dairies from tuberculous cows, and the result is shown by the difference between the city and country milk. In Manchester † the milk from 542 farms was tested for tubercle bacilli by inoculating guinea pigs, and 42 samples, or 7.7 per cent, were found to be infected.

The city of Plainfield and town of Montclair, N.J., always issue interesting health reports. Both communities make great effort to maintain their milk supplies at a high standard. One method of accomplishing this, and at the same time educating the consumers as well as the producers, is by publishing the averages of the analyses of milk from all the dealers supplying the city. This of course would not be practicable in a large community, but would seem to be a very useful procedure in small cities or towns. Not only are the average fats, solids and bacteria given, but each farm is visited and rated according to the standard score card used by the United States Department of Agriculture, and the results of this scoring also are published.

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* Report on the Health of the City of Liverpool, 1906, p. 189.

† Report on the Health of the City of Manchester, 1906, p. 187.

ISOLATION HOSPITALS. Attention has previously been called to the successful working of the Pasteur Hospital in Paris, where different contagious diseases are treated by the same nurse in cubicles opening into a common corridor. The idea that aerial infection can be ignored, and that contact infection can be avoided by scrupulous care on the part of attendants, seems to be gaining ground. About a year ago a hospital on this plan was erected at Walthamstow, England,* and has been in successful operation ever since. It is true these cubicles do not open into a common corridor, but on to a veranda. Different diseases are, however, cared for by the same nurse. The old London Fever Hospital is about to erect a pavilion on exactly the plan of the Pasteur Hospital. At the Southwestern Hospital, in London, the separation of patients is even less than in the hospitals just mentioned. The partitions between the beds extend only seven feet above the floor, falling considerably short of the ceiling. Dwarf doors about three feet high are provided, opening into a central corridor.

The belief that the desquamation of scarlet fever is not infectious also seems to be gaining ground. At Manchester, England,† during 1906 scarlet-fever patients were discharged from the hospital at the end of four weeks without reference to desquamation, provided there was no nasal or aural discharge or other complications. The average time spent in the hospital was thus reduced about two weeks. There were no bad results from the discharge of desquamating patients.

While it is useless to expect that isolation hospitals will ever exterminate the contagious diseases, yet there is no doubt that their use accomplishes a great deal of good. It is interesting to note just how much can be accomplished in the way of preventing extension of the disease in the family by removing cases to the hospital. Dr. Malet of Wolverhampton [*] states that during eight years, of 4,864 susceptible children remaining at home after a scarlet-fever case had been removed to the hospital, 4.8 per cent contracted scarlet fever; while of 468 susceptible children in houses where the patient was treated at home, 28.2 per cent contracted the disease. These figures are more favorable than those from Providence,[†] where the attack rate is only diminished about one-half by the removal of the patient to the hospital.

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* Public Health, April, 1908, p. 72.

† Report on the Health of the City of Manchester, 1906, p. 257.

FLIES AND DISEASE. Professor Delepine [‡] is continuing his experiments in regard to the relation between flies and the spread of disease. Flytraps are maintained at a dozen or more different places scattered over the city, and the number of flies caught each week is noted. There appears to be little relation between the prevalence of typhoid fever and an abundance of flies. This may possibly be due to the fact that there is very little typhoid fever in Manchester, and hence little infective material to be carried by the flies. Dr. Niven, the medical officer of health, thinks that a good deal of the Manchester typhoid is due to eating contaminated shellfish, and he determined, in 1906, that 36.8 per cent was due to contact infection, that is, was traced to previous cases. It is believed in Manchester that there is a relationship between infantile diarrhœa and flies. An increase of diarrhœa follows an increase of flies by three or four days. In 1905 the maximum fly time was in the first part of September, and the maximum deaths from diarrhœa immediately followed. In

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[*] Public Health, April, 1908, p. 72.

[†] Report of the Superintendent of Health, 1903, p. 27.

[‡] Report on the Health of the City of Manchester, 1906, p. 82.

1906 the maximum for flies was August 5, immediately followed by the maximum for diarrhœa. Thirty-five collections of flies were tested by Professor Delepine and coli bacilli were recovered from 4. The method of collecting and examining the flies is described. At the administration building of the hospital 300 flies marked with white enamel on the back were liberated, and within five days 4 of them were caught in neighboring wards, distant from 30 to 190 yards.

INACCURACY OF THE CLINICAL DIAGNOSIS OF DIPHTHERIA. It will be remembered that Hill, by a somewhat elaborate calculation based on cultures examined at the bacteriological laboratory in Boston, arrived at the conclusion that the margin of error in the ordinary clinical diagnosis of diphtheria is about 50 per cent. It is worthy of note that of 162 cases sent to the hospital in Walthamstow, England,* 79 proved not to be diphtheria, making the error in diagnosis 48 per cent. It is surprising to learn how little use is made of cultures for diagnosis in many English cities. Thus in Newcastle† there were 288 reported cases of diphtheria, but only 179 cultures were examined, of which 87 were from contacts in a public institution.

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* Report of the Medical Officer of Health, 1905, p. 35.

† Report of the Medical Officer of Health, Newcastle-upon-Tyne, 1905, p. 6.

SANITARY ENGINEERING NOTES

By ROBERT SPURR WESTON
Assoc. M. Am. Soc. C. E.

NOVELTIES IN FILTRATION AND THEIR THEORY.* An interesting and thorough account of recent developments on the European Continent and of the author's experience with preliminary filtration as an auxiliary to water purification.

The delayed development of water purification in France has been due, in part, to the opposition of hygienists, who objected to water filters on theoretical grounds and in the face of evidences of their efficiency. These objections have caused the French engineers to improve their purification devices in order to force their recognition by the hygienists. In 1900, M. Puech, a French cloth manufacturer, published an account of his system. A typical plant at Suresnes consists of successive filters of gravel, the size of the gravel and the rate of filtration diminishing with each successive filter, the rates being 225, 130, 75 and 45 million gallons per acre per diem respectively, and the effluent being discharged upon two sand filters operating at the rates of 15 and 2.5 million gallons per acre per day, respectively. The water treated is very muddy, yet at the worst times the effluent from the gravel filters is scarcely opalescent, while the effluent from the last sand filter contains fewer bacteria than the "pure" spring water supply of the city.

Kemna experimented at Antwerp with a gravel strainer which he used as a roughing filter for an ordinary sand filter.

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* Ad Kemna, Eng. News, 59, 328.

The gravel filter was divided into three successive compartments and operated at the rates of 80, 80 and 40 million gallons per acre per day, respectively. Mixed gravel was used at first. It clogged rapidly and was replaced with graded gravel which worked satisfactorily. There was a marked retention of suspended particles, even of very small size, and also a chemical action on the organic matter, free ammonia being produced to a remarkable degree.

The action of the gravel is a physical one. The particles are removed by adhesion, that is, by attraction, consequently the finest particles are easiest removed. Their retention is a question of multiplicity of contacts largely independent of speed. There is probably some bacterial action also, as in a trickling sewage filter. The time of contact with gravel was less than fifteen minutes. Gravel roughing filters are easily cleaned, relieving sand filters of much work. Their advisability must be determined by their cost when compared with that of a subsiding basin of like efficiency. It is believed that sand in a sand filter acts to retain bacteria just as the gravel acts to retain suspended matter. Preliminary filtration has been used at Zurich many years. The filter consists of 12 inches of coarse sand and 24 inches of gravel, and the rate of filtration is about 50 million gallons per acre per day. Mechanical filters as preliminary filters, and the cleaning of slow sand filters by suction dredges without treating of the water, are mentioned. The writer also describes a new porous under-drain made of 3-inch slabs of gravel concrete with a minimum of cement. Their use must be limited however.

At the St. Maur filtering station at Paris, experiments are being made upon the sterilization of filtered water. Two systems of ozone treatment and the Duyk Ferrochlor system are being tried. They are a commentary upon the high standards of the French hygienists. The impracticability of Miquel's method of counting bacteria, which requires fifteen days, is brought to notice, and the usefulness of his test for *B. coli*, which requires but twenty-four hours, is commended. The author criticises the finical rules of the French hygienists, which require a filter effluent in which *B. coli* is found to be run to waste for five days. The simple presence of *B. coli* is not so important as the number of these organisms present.

In general the author thinks that the attempts of the French engineers to comply with the high standards of the hygienists have resulted in improvements, even if they disregard the advances made in other countries.

CHEMICAL PRECIPITATION OF WATER AT ST. LOUIS, MO.* Two articles on the water purifying system of the city of St. Louis have been reviewed in this journal. This article is an abstract of a paper recently presented before the American Society of Civil Engineers, by E. E. Wall, C.E., Assistant Water Commissioner of St. Louis, which describes some new apparatus devised to handle the coagulant used to purify the water and also gives more recent operation statistics. The vast quantity of water handled has made it judicious to add varying amounts of dry quicklime and dry ferrous sulphate to tanks of water through which the current flows uniformly and constantly. To reduce the loss of lime due to insufficient hydration, the heat produced by slaking the lime is used to make the milk of lime.

The cost of treatment has been as follows:

1904–5	$3.60
1905–6	3.99
1906–7	4.62

On an average during 1906–7, 2.13 grains of ferrous sulphate and 7.39 grains of lime were added to each gallon of raw water. The new plant is being designed to handle the coagulant more cheaply. The cost of operation of this part of the plant is estimated at $17,000 a year for seventy-five million gallons daily. The results show a slightly turbid water, which at most times possesses a caustic alkalinity. The author believes that it is pure and wholesome. He makes no mention of the tendency toward a deposit of calcium and magnesium carbonates in the distribution system, especially in the water meters.

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* Eng. News, 59, 188.

A NOTABLE GROUND WATER DEVELOPMENT AT PUEBLO, COLO.* Owing to the polluted character of the Arkansas River, a new supply was needed for the city of Pueblo. The topography of the country, the nature of the formation in the valley of the Fountain River, which flows into the Arkansas River, is such that there is a remarkable underground supply beneath the river bed, apparently independent of the surface flow, having its source in the almost perennial snow of the Pike's Peak district, with adequate quantity besides. Galleries arranged herringbone fashion were driven beneath the river bed at a point fourteen miles from the city; they delivered water into a well from which a conduit takes the water to two reservoirs on a hill near the city.

Following the description of the nature and character of this interesting supply is a detailed account of the construction of the system is given, including the method of making concrete pipe on the work and the difficulties encountered in laying it below the ground water level.

SANITARY INVESTIGATION OF THE MOHAWK RIVER DRAINAGE AREA.† A review of the report of the New York State Department of Health on the condition of the Mohawk River shows that there is considerable pollution of that stream from municipal outfall sewers and by factory wastes, troublesome especially in dry weather. Using the power vested in it by the Act of 1903, the Health Department has approved only those plans for sewerage systems which make provision for sewage disposal works. It has investigated the matter of villages violating public health laws, and has advised all communities to use only filtered water; but it has been handicapped in achieving the best results because the flow from existing outfall sewers is beyond its prohibition.

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* Eng. Record, 57, 399.

† Eng. News, 59, 376.

STUDY OF THE ECONOMIC COSTS OF TYPHOID FEVER IN TWO WARDS OF PITTSBURG, PA.* An abstract with statistical appendix of a report by Mr. Frank E. Wing of a study of 194 cases of typhoid fever at Pittsburg. There were 11 deaths and 183 recoveries. The actual loss in wages was estimated at $12,459, but this cost was augmented by the cost of caring for the patients in hospitals and homes, also by the cost of funerals. The total cost aggregated $24,345, the same being the cost of less than half the cases of typhoid fever in two wards during one year. There were 5,637 cases in the whole city during the same year. Typhoid has prevailed at Pittsburg for twenty-five years, and its annual cost to the community on the above basis would amount to several hundred thousand dollars. Beside the money loss is the loss of health which often follows typhoid fever, and the effect upon the comfort and strength of the patient, which the disease imposes. The study clearly indicates the drainage of the vital forces of the community which typhoid fever causes.

PROPOSED NATIONAL PUBLIC HEALTH AND WATER SUPPLY AND SEWERAGE INVESTIGATIONS.† A bill introduced in the House of Representatives on March

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* Eng. News, 59, 252.

† Eng. News, 59, 373.

6, by Mr. Hepburn of Iowa, would enlarge the powers and duties of the United States Public Health and Marine-Hospital Service, authorizing it to make special investigations of tuberculosis, typhoid fever and other diseases, and of water purification and sewerage disposal with particular reference to stream pollution. Provision is made for the establishment of a school of hygiene open to State, county and municipal health officers and for increasing the number of conferences between the United States Public Health and Marine-Hospital Service and the public health authorities of the several States. The duties and compensation of the Advisory Board of the Hygienic Laboratory are also increased. A sanitary engineer would be appointed to take charge of the technical matters connected with water supply and sewerage.

The bill provides for the substantial enlargement of the present scope of the United States Public Health and Marine-Hospital Service, but that part relating to stream pollution would seem on its face to be a duplication of the work now being done most efficiently by the hydrographic department of the United States Geologic Survey.

TYPHOID FEVER EPIDEMIC AT WATERTOWN, N.Y., IN 1904.* From 1885 to 1903 typhoid fever was responsible for 4.17 per cent of all deaths in Watertown. In 1904 the total death rate was 12.81 per cent. While the cause of the prevalence of this disease was attributed to the water supply, the town was very slow in making an investigation into the causes. In 1904, at the height of the epidemic, the situation became urgent and Dr. Soper was placed in charge of the sanitation of the city. He adopted stringent measures to stop the epidemic, urging special care of the sick, supplying disinfectants free, and distributing spring water at a cost of only one cent a gallon, and hastening the construction of the filter plant.

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* Abstract of paper by Dr. G. A. Soper, Eng. News, 59, 315.

A special bacteriological laboratory was installed at the city's expense, and all houses in which patients had been ill were thoroughly fumigated. The measures adopted proved effective. A filter plant designed by Allen Hazen, C.E., was pushed to completion and the typhoid-fever death rate was greatly reduced.

THE FUTILITY OF RULES FOR THE PROTECTION OF SURFACE-WATER SUPPLIES IN NEW YORK STATE.* Futility of the rules, in themselves stringent and theoretically legally effective, is shown in the case of the Watertown typhoid-fever epidemic of 1904 and in the recent experience at Peekskill, N.Y.

There are two difficulties in the way of enforcing the rules:

1. The expense of excluding pollution is incumbent upon the water authorities alone, while the offending person, corporation or municipality goes scot free.
2. The necessary sanitary control of the surface supply covers such an extent of territory that only large cities can afford it. Both of these difficulties have resulted in the unpardonable neglect of ordinary sanitary precautions, and revision of the law should be made, providing, among other things, that the State rather than the local authorities have control of those large drainage areas from which water supplies are drawn.

WATER SUPPLY AND TYPHOID FEVER AT WASHINGTON, D.C.† A symposium on typhoid fever was held by the Medical Society of the District of Columbia. The papers read practically removed the suspicion cast on the slow sand filters, because the typhoid fever was not being reduced as expected. Dr. Magruder, in his introduction, said that it would be possible to reduce disease by additional authority to the District Commissioners for the regulation of dairy products, — milk, cream, ice cream and butter, — a bacteriological laboratory and more inspectors for the Health Department. Major Crosby stated that a period of seven to ten days elapsed before the water of the Potomac River passing the last important source of pollution reached the consumer. In regard to the discussion of using sedimentation or coagulation before filtering, he said that the former had reduced the turbidity by 63 per cent, and the bacterial count by 87 per cent. Dr. Longley upheld the latter method. The Typhoid Board accounted for approximately 30 per cent of the typhoid cases in 1906, and 50 per cent in 1907, the chief causes being milk, contacts and importation. Dr. Wiley discussed the dangers of domestic filters, water-coolers and ice cream, the last being severly censured.

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* Editorial in Eng. News, 59, 343.

† Eng. News, 59, 222.

Further papers were given on Dairy Farm Inspection, on Dangers from Infection and Dangers due to Chronic Typhoid Bacillus Carriers. A few interesting statistical tables are appended.

MORE LIGHT ON THE WASHINGTON TYPHOID AND WATER-SUPPLY PROBLEMS.* Comment is made on the way in which the filters, the only scientifically designed barrier to the spread of typhoid in that city, were condemned when the other sanitary conditions were so deplorable. Inferences are drawn from the per cents of the cases studied and known about, pointing to more effective inspection in 1907. The whole case shows the need for thorough investigation everywhere of each typhoid case. Some members of the Medical Society are scored for preferring sedimentation to coagulation in view of the conditions existing at Washington.

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* Editorial in Eng. News, 59, 226.

THE DEVELOPMENT OF THE MECHANICAL FILTER PLANT.* This is a review of an excellent paper read by Mr. Philip Burgess at a meeting of the Ohio Engineering Society at Columbus.

After a brief history of mechanical filtration, noting the improvement in design and in the materials of construction, as well as the automatic devices for operation, the paper gives a systematic account of the evolution of various parts of this type of filtration plant, namely, filter tanks, strainer systems, arrangement of wash-water troughs, agitation, filtering material, coagulation and coagulants, also an account of improvements in auxiliary machinery and clear water reservoirs.

HIGH RELATIVE RATES OF FILTRATION WITH SLOW SAND FILTERS.† Slow sand filters are now designed to operate at rates of 2.5 to 3 million gallons per acre per diem, although experimental evidence has shown that higher rates are practicable. These low rates are necessary where filters have to be drained and scraped by hand, because the scraping process requires twelve hours and high rates would make necessary larger reserve areas. With higher rates, finer sand could be used. Author has tested Blaisdell's filter sand washing machine, which cleans the sand without disturbing the water above the filter and without keeping the filter out of service for more than an hour or so. The work can be done with one or two men at any hour of the day or night. The machine permits higher rates, even as high as ten million gallons per acre per diem, with corresponding reduction of cost of construction. The machine consists of an inverted open box four feet square by two feet deep, suspended from an electrically operated movable platform. The box contains a revolving hollow rake, through whose hollow teeth water is pumped. The box is lowered to the sand surface, water is forced through the rake teeth, and a suction pipe takes away the dirty water. A little extra water is continually sucked from beneath the edges of the box. This prevents stirring up the water over the filter sand, and enables the work of sand washing to be observed. It has been used with success at Yuma, Ariz., for four years. It has been recommended for the proposed Croton filters by the author, who has made extended experiments with it at the Jerome Park Reservoir, New York.

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* Eng. News, 59, 249.

† W. B. Fuller, Eng. News, 59, 287.

VITAL STATISTICS

By **MARSHALL LANGTON PRICE, M.D.**
Secretary State Board of Health of Maryland, Baltimore, Md.

SOME OF THE PURPOSES OF THE SECTION. The Editor must confess that he views the approach of his duties in establishing and maintaining a new section in the AMERICAN JOURNAL OF PUBLIC HYGIENE with some trepidation. Part of this is no doubt due to the quasi-apologetic standpoint which the statistician must perforce assume in dealing with a subject held in slighting estimation by the general public, but mainly from the vast importance of the subject itself. It is such a large Goliath and the pebbles are so small and few. Statistics is a fundamental science; like other fundamentals it is often forgotten or ignored. We admire the beautiful structure, but we give no thought to its foundation hidden underground.

Knowledge is the power through which we walk, unscathed, among the powers of darkness, and Statistics is the supreme court of Knowledge; and if Statistics is the supreme court of all knowledge, Vital Statistics is the court of last resort for all knowledge of public hygiene.

Statistics has suffered most from the hands of her professed followers, but because the inner sanctuary has been violated by the profane, let not the whole temple fall into disrepute. Unlike our civil courts which guard only our property and liberty, hygiene is the guardian of our greatest possession — our lives. As the Testament puts it, "Everything that a man hath, that will he give for his life," and vital statistics must always be the supreme court of hygiene, the science of the conservation of human life. By this always delicate and accurate instrument we can determine our errors, measure our progress, and map out our future course.

To carry out our simile, it will be the endeavor of this section to show, through the work of others, how this machine can be used to best advantage for the betterment of the public health, and how errors in its use can be best avoided and corrected.

THE IMPORTANCE OF VITAL STATISTICS. Vital statistics is the most important of statistical studies. This is true from the merely economic standpoint. All property other than real, having intrinsic value, derives its value from the population. Considering the subject from the hygienic standpoint, we can truthfully say, that all permanent hygienic advancement is founded upon data derived from the study of vital statistics. The fundamental data upon which vital statistics are founded are, the birth rate, the death rate and the duration of life. The whole purpose of public hygiene is to increase the birth rate, decrease the death rate and increase the duration of life. In vital statistics we find not only the measure of our efficiency, but the means by which we can obtain these ends.

OFFICIAL STATISTICS IN THE UNITED STATES. The official recognition by the United States Government of the importance of its vital statistics, if tardy, is no less gratifying. The attachment of the Census Bureau to the Department of Commerce and Labor is probably the best arrangement that could be made under existing circumstances. The Bureau has always ranked high among the Government services and its increased power and appropriations have already become manifest, in the later publication of the Bureau. Particularly valuable to sanitarians are the annual publications on mortality statistics. The Seventh Annual Report of Mortality Statistics for the year 1906 has been recently issued by the Bureau of the Census. This report consists of 480 pages, containing numerous tables of mortality statistics. The summary and rate tables are particularly valuable in studying the prevalence and geographical distribution of the various diseases. The relation of color, age and sex have been tabulated with especial care. A great deal of valuable statistical information is furnished about the principal causes of death. The introduction should be read and studied by all registrars, as it points out the defects in our present system and the means by which effective returns can be secured.

PERPLEXITIES OF MORTALITY STATISTICS. Some of these have been referred to in the volume just cited, but as they are met with in all registration areas they may be briefly mentioned here. It has been stated by physiologists that no two persons see the same color in exactly the same way; for instance, the impression made by the color red on one man's retina is never exactly the same as that made on the retina of another man by the same color; in like manner, one disease may give rise to very different impressions in the minds of two physicians. This personal idiosyncrasy will be very evident to any one who examines a large number of original death records. This "personal equation," the unknown x of our philosophical algebra, must always mean more or less variation in our results. Another confusing factor is the irregular methods used by some registration officers in compiling death returns. This can naturally be more easily influenced than the "personal equation" of those making the record of death. If we add to this the different definitions given to the same disease by colloquial nomenclature in different areas we can better appreciate the difficulties with which registrars have to cope. Thus, to cite a single example, cholera morbus in France means Asiatic cholera, while in the United States the term is generally applied to the simple colic, or other more or less serious digestive disorders due to indiscretions in diet.

SOME OFFICIAL FOREIGN STATISTICS. The *Informe Mensual Sanitario y Demografico de la Republica de Cuba*, published by the Junta Superior de Sanidad de la Isla de Cuba (the Superior Board of Health of the Island of Cuba), in Spanish and English, has been issued for the year 1906. The publication, as is to be expected, lays great stress on the returns for yellow fever. The general death rate for Cuba, assuming the mortality registrations to be correct and complete, is only 20.77 per thousand for the municipal district of Havana; 36 cases of yellow fever are reported with 11 deaths. Tuberculosis is the prominent cause of death, and judging from the mortality and morbidity returns is a serious scourge on the island. Thus during the month of September there were treated in the Special Dispensary for Tuberculosis, 10,459 cases. The highest death rate for tuberculosis was reported from the province of Consolacion del Norte, 30.38 per ten thousand. Judging from the returns of contagious diseases, notification is rather strictly observed on the island. Of interest in the birth returns are the relatively high number of illegitimate births, which comprise over two-thirds of the colored births. The infant mortality, as would be expected, is considerably higher than in the United States or Continental Europe, nearly forty per cent of the recorded deaths are under the age of five years. The total deaths for the year 1906 numbered 5,090, of which only 9 were due to yellow fever, and 967 to tuberculosis.

The Cuban Republic makes use of the International classifications of causes of death in tabulating and compiling its mortality returns.

SOME STATISTICS OF SOUTH AMERICA. The *Annario Estadistica de la Republica Oriental del Uruguay* published biennially in French and Spanish by the Consejo Superior de Estadistica, was published in Montevideo on the 18th of July, 1907. This report is in the nature of a biennial census, and contains the general data found in American and European censuses. The section on Demography comprises one of the largest and most important sections of the volume. The International classification is employed. The work is systematically arranged and complete and profusely illustrated with colored plates. The population is estimated at 1,100,000. Full data are given regarding the population, including comparisons with the population of the principal countries of the Eastern and Western Hemispheres. The bulk of the present foreign population is Italian and Spanish, the former predominating. An interesting feature of the report are the maps of the provinces in which the birth and death rates, and death rates from the various contagious diseases, are shown. It is of interest to observe that the reversal of the seasons in the sub-equatorial zones is indicated in the mortality from affections of the alimentary tract; the highest mortality for these diseases is in December, and the lowest in August,— a complete reversal of the seasonal mortality in our temperate zones.

OUR AMERICAN BIRTH REGISTRATION. Dr. Cressey L. Wilbur, in his introduction to Mortality Statistics of the Census Bureau for 1906, makes a forceful plea for concerted effort on the part of registration areas to secure complete birth returns. The maps illustrate the argument very effectively. In these maps the registration States are indicated by dark areas. These maps show that in 1895 the registration States were limited to New England, New York, New Jersey and Delaware. In 1907 there was a substantial acquisition by the inclusion of Pennsylvania, Maryland, Michigan, Indiana, South Dakota, Colorado and California. The maps of births, however, show the same virgin uncultivated field in 1907 that appeared on the map of 1895. When we consider that in civilized countries the birth certificate is the basis for school attendance, voting, marriage, acquisition of property, and practically all factors concerned in civil rights, liabilities and privileges, we can only look with wonder on a country which treats one of its most important fundamentals of civilization with the contempt of the vandal for knowledge and culture; but such must, judging from practical results, be the attitude of our public opinion and our statutes towards birth registration.

STATISTICAL FALLACIES. America has the name of being a flourishing garden for the growth of statistical fallacies. To prevent the growth of statistical fallacies in the garden of figures is as difficult as to exclude garlic from a cow pasture. The lesson which statisticians must learn is the *significance of figures*. To be a statistician requires more than to be a good bookkeeper; the main essential, of course, is the same as that of any other problem in arithmetic, namely, to obtain correct figures; but to recognize their significance requires unusual discrimination and logic. This involves primarily the distinction between cause and effect. Thus if statistics indicates that the bulk of red-headed women avoid yellow and purple dresses, the simple bookkeeper may decide that red hair is due to the lack of these colors worn upon the body, while the statistician will correctly ascribe this result to the feminine perception of harmony for colors.

The first of the statistical fallacies to which I will call attention is one of the commonest in this country, that is, that the average age at death is equal to the average duration of life, or that the increase in the average age at death indicates necessarily a corresponding increase in the average duration of life. This is practically true where there is a fixed non-fluctuating population, but is not true in our average American cities, especially those in the middle West; one of the most prominent of which constantly interprets its increased average age at death to mean an increase in the average duration of life. The history of the population of these American cities of rapid growth is practically always the same. They are established at first by young persons among whom the death rate is low, but the average age at death is also somewhat low owing to the youth of the population. In a population of this character the birth rate will be unusually high, and the average at death will fall accordingly to a low figure, owing to deaths among infants; finally, as occurs in all long-established municipalities, the number of old persons increases, and the average of death is high, though the mortality may be stationary or even increasing. To show how absolutely dependent the average age at death is on the population, we may cite as an extreme instance an island county in which the total population are the inmates of an infant asylum. In this case, though the mortality, by ages, may be below the average, the average age at death will, probably, range below two years for the county. Now let us suppose the county to abandon the infant asylum and the institution to be converted into a home for the aged. In this case the same county will give an average age at death of sixty-five to seventy years, though the mortality may be, and under these circumstances would necessarily be high.

PREVENTIVE THERAPEUTICS

By H. D. PEASE, M.D.
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SERUM TREATMENT OF EPIDEMIC CEREBRO-SPINAL MENINGITIS.* The authors† refer to prior work by Flexner on the use of an antiserum prepared from small animals by the treatment of them with *Diplococcus intracellularis*, in the treatment of animals infected with cultures of this organism.

They now report the results of the use on cases of epidemic cerebro-spinal meningitis of an antiserum obtained from the horse after its treatment with the specific meningococcus.

These cases occurred in the cities of New York, Philadelphia and Cleveland; Castalia and Akron, Ohio; Edinburgh Scotland, and Belfast, Ireland.

In all cases the anti-meningitis serum was administered by lumbar puncture into the subarachnoid space after the withdrawal of cerebro-spinal fluid up to as high as 90 c.c. The doses of the antiserum varied from 10 c.c. to 30 c.c., and the total amounts given ran as high as 120 c.c. in four days.

The serum was prepared as follows:

Killed cultures of a number of strains of the *Diplococcus intracellularis* were given the horse subcutaneously in increasing doses. Later doses of living meningococci were given intravenously in progressive doses, but were discontinued because of the severe reactions they produced.

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* Journal of Experimental Medicine, 1908, Vol. X, 141.

† S. Flexner and J. W. Robling.

The serum is tested upon guinea pigs, against the autolyzed cultures of the organism. The results of such tests are only approximately accurate.

There were in all 47 cases of epidemic meningitis treated with this antiserum, and of these 34 recovered and 13 died.

Of the latter, four were fulminant cases and died within thirty-six hours of the onset of symptoms. Excluding these, about 80 per cent recovered when the serum was given within three days of the onset of the disease.

Other evidence shows that the epidemics in which these cases occurred had a very much greater mortality rate, eighty per cent. About one-half of the cases injected recovered by crisis.

In a few cases the active symptoms were arrested suddenly, and later there were relapses, which were again controlled by a second injection of the serum.

The authors state that the direct effect of the antiserum on the diplococci present in the exudate in the cerebro-spinal membranes is to cause their rapid degeneration and an attempted arrest of their free multiplication. Cultures from fluid obtained at later lumbar punctures are usually sterile. The authors also believe the serum has some antitoxic value as well as anti-bacterial qualities.

They discuss the question of anaphylaxis. The results in which several injections of serum were made, sometimes with long intervals between, tend to show that the danger of supersensitization is not very real, and they believe it does not need to be constant in practice.

The serum should be used early, although in the late stages it apparently brought a prolonged case to an abrupt termination.

Regarding the value of the antiserum, the authors make this statement: "No one could be less convinced of the final fact of its value than we are." On the other hand, they believe it should receive a more extended trial, and they are prepared to distribute serum for use under conditions which they will prescribe.

PUBLIC HEALTH LEGISLATION, NEWS AND NOTES

By F. H. SLACK, M.D.
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DAIRY INSPECTION IN CONNECTICUT.* The following law was enacted by the last General Assembly:

> The dairy commissioner shall make an investigation and examination of the premises of any farm or dairy, or of any place where cattle, dairy stock, or other domestic animals are kept, within this State, where any unsanitary condition affecting the products of such farm or dairy exists or is reported or suspected to exist. When any such condition shall be found by said dairy commissioner he shall notify the owner or occupant of the premises upon which said condition exists to remove or abate the same, at the expense of such owner or occupant, within such time as the dairy commissioner shall direct; and if such owner or occupant shall neglect to remove or abate such condition within said time so prescribed, he shall be fined not more than twenty-five dollars and shall pay such expense and costs as shall be incurred in such removal or abatement. The dairy commissioner is authorized and empowered to employ such assistants as shall be necessary to enforce the provisions of this act, and said commissioner and assistants shall have free access, at all reasonable hours, to all such premises and places for the purpose of making the examination and investigation provided by this act. Every person refusing such access shall be fined not more than seven dollars, or imprisoned not more than thirty days, or both.

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* Bulletin Connecticut State Board of Health, March, 1908.

METHODS OF TASTING MILK. New regulation by the Board of Health of Boston, Mass.:

> At a meeting of the Board of Health the following regulation was adopted: Whereas, milk may be, and frequently is, made the carrier of typhoid fever, diphtheria, scarlet fever and other infectious and contagious diseases, and, whereas, the germs of said diseases may be imparted to milk by persons in the act of testing, by tasting or otherwise handling milk before delivery to consumers, it is, therefore, ordered: Whoever tests milk or cream which is to be offered for sale in any form by tasting shall do so by means of a spoon or piece of wood, paper, cardboard or other article, and such spoon, piece of wood, paper, cardboard or other article shall not again be used for testing milk until after being thoroughly washed and sterilized; no person shall permit his hands, fingers, lips or tongue to come in contact with milk intended for sale in any form. All persons engaged in the tasting, mixing or handling of milk for sale in any form shall, before engaging in such tasting, mixing or handling, thoroughly clean his hands and finger nails and keep them clean and dry during such testing, mixing or handling. No person shall permit his hands while wet to remain or pass over any open vessel containing milk intended for sale in any form. No person shall fill a jar, can or other receptacle with milk while the aforesaid jar, can or other receptacle is held over an open vessel containing milk intended for sale in any form. No person who has sore throat, diarrhœa, or is suffering from any other disturbance of the bowels, or has symptoms of infectious or contagious disease, shall engage in the handling of milk which is to be offered for sale or which is for sale.

PASTEUR TREATMENT, FLORIDA.* The State Board of Health has made arrangements whereby the Pasteur treatment for hydrophobia can be given without sending the patient away from the State.

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* Journ. A. M. A., April 25, 1908.

FREE ANTITOXIN, GEORGIA.* The State Board of Health announces through its secretary, Dr. Henry F. Harris, Atlanta, that on or about March 15 the Board will begin the manufacture of diphtheria antitoxin for free distribution to patients throughout the State.

STATE BOARD OF HEALTH, VIRGINIA.† By Act of the General Assembly, the present State Board of Health is legislated out of office, July 1, 1908. The new State Board of Health will consist of twelve members, appointed by the Governor, who shall be members of the State medical society, one of whom shall be chosen from each Congressional District, and in addition, two from the city of Richmond. The Governor shall appoint a Health Commissioner, who shall be executive officer of the State Board of Health. He shall be vested with all the authority of the Board and subject to such rules and regulations as may be prescribed by the Board. The Health Commissioner, with the approval of the State Board of Health, shall appoint an assistant commissioner, skilled bacteriologist, and a clerk. The State Board of Health shall establish and maintain in the city of Richmond suitable laboratories for the examination of clinical material submitted by members of the medical profession of the State, and such examination shall be made free of charge.

It shall be the duty of the State Board of Health as soon as practicable to begin the erection and maintenance of temporary or permanent buildings or camps, for the treatment of tuberculosis, in such localities as are proper, and at such sanitariums they shall provide for the treatment by the most advanced methods of the tuberculosis patients in the State, at a minimum expense to the patient.

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* Journ. A. M. A., April 25, 1908.

† Bulletin Virginia State Board of Health, March, 1908.

REPORT OF BUREAU OF HEALTH, PHILIPPINE ISLANDS. The report of Victor G. Heiser, M.D., Director of Health for the Philippine Islands for the fiscal year ending June 30, 1907, contains much of interest as to the progress of sanitation under American rule:

> The effect of the sanitary reforms, which have been persistently carried out during the past few years, commenced to show in a most concrete and substantial manner during the period covered by this report. The public health has been more satisfactory than at any time since the American occupation of the Philippines, from which it is reasonable to infer that health conditions are better now than at any time for the past one hundred years or more. The death rate per thousand for the city of Manila has been reduced from 40.90 last year to 36.91; the rate for Americans being 5.59, which is a reduction of 3.75 over the previous year, and among Spaniards the rate dropped from 17.40 to 15.84.
>
> There has not been a single case of plague in the islands, and not one death from smallpox in the city of Manila. Cholera in recognizable form has disappeared entirely from the Archipelago. The provinces of Cavite, Batangas, Cebu, Rizal, La Laguna, Bataan and La Union, where heretofore there have been approximately 6,000 deaths annually from smallpox, have not reported one death from this disease. In all there have been over 2,000,000 vaccinations performed, the direct effect of which was that many lives were spared and thousands of persons were saved from being disfigured for life, and at the few places where smallpox did break out it made no headway.
>
> Great strides were made in introducing better drinking water, artesian wells being now in actual use in many of the towns of the provinces.

MISCELLANEOUS NOTES

GOOD RESULTS OBTAINED WITH THE TROMSDORFF METHOD OF LEUCOCYTE AND PUS CELL ENUMERATION IN MILK.* Dr. Rullman, the co-worker of Tromsdorff, makes an effort to lay great stress upon the good results obtained with "Tromsdorff's method for the determination of pus in milk," in the city of Munich, Germany.

This method has been adopted by the local authorities, who have accepted the standards of pus cell or leucocyte content of milk as set down by Tromsdorff and Rullman. The authorities have further distributed circulars to the milk producers and dealers, setting forth in the main the following rules and recommendations:

1. Cows which have any kind of an inflammation in one or more quarters of the udder are to be considered diseased.

2. Animals which have only one, two or three good quarters are not to be considered healthy, notwithstanding the fact that to all appearances the malady in the other quarter or quarters has ceased.

3. That milk from cows with inflamed udders must not be put in with the regular delivery and should be destroyed. (It is further stated that procedures of this kind may seem to be direct losses to the milk producer, while in reality it is to the contrary, and is a means of preventing an epidemic, and finally enormous losses to the milk industry in general.)

4. Further and finally it is recommended that should any doubt exist in the mind of the milk producer as to whether a diseased condition exists or not, samples of milk should be sent to the municipal authorities at Munich for examination. The milk is examined free of all cost to the sender.

(Abstract by Lewis W. Fetzer.)

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* Milch-Zeiting, Leipzig, Jan. 25, 1908, No. 4.

COMMUNICATIONS

The Central Committee of the International Congress on Tuberculosis has announced the offer of the following prizes:

I. A prize of $1,000 is offered for the best evidence of effective work in the prevention or relief of tuberculosis by any voluntary association since the last International Congress in 1905. In addition to the prize of $1,000, two gold medals and three silver medals will be awarded. The prize and medals will be accompanied by diplomas or certificates of award.

Evidence is to include all forms of printed matter, educational leaflets, etc.; report showing increase of membership, organization, classes reached — such as labor unions, schools, churches, etc.; lectures given; influence in stimulating local Boards of Health, schools, dispensaries, hospitals for the care of tuberculosis; newspaper clippings of meetings held; methods of raising money; method of keeping accounts.

Each competitor must present a brief or report in printed form. No formal announcement of intention to compete is required.

II. A prize of $1,000 is offered for the best exhibit of an existing sanatorium for the treatment of curable cases of tuberculosis among the working classes. In addition to the prize of $1,000, two gold medals and three silver medals will be awarded. The prize and medals will be accompanied by diplomas or certificates of award.

The exhibit must show in detail construction, equipment, management and results obtained. Each competitor must present a brief or report in printed form.

III. A prize of $1,000 is offered for the best exhibit of a furnished house, for a family or group of families of the working class, designed in the interest of the crusade against tuberculosis. In addition to the prize of $1,000, two gold medals and three silver medals will be awarded. The prize and medals will be accompanied by diplomas or certificates of award. This prize is designed to stimulate efforts towards securing a maximum of sunlight, ventilation, proper heating and general sanitary arrangement for an inexpensive home. A model of house and furnishing is required. Each competitor must present a brief with drawings, specifications, estimates, etc., with an explanation of points of special excellence. Entry may be made under competitor's own name.

IV. A prize of $1,000 is offered for the best exhibit of a dispensary or kindred institution for the treatment of the tuberculous poor. In addition to the prize of $1,000, two gold medals and three silver medals will be awarded. The prize and medals will be accompanied by diplomas or certificates of award.

The exhibit must show in detail construction, equipment, management and results obtained. Each competitor must present a brief or report in printed form.

V. A prize of $1,000 is offered for the best exhibit of a hospital for the treatment of advanced pulmonary tuberculosis. In addition to the prize of $1,000, two gold medals and three silver medals will be awarded. The prize and medals will be accompanied by diplomas or certificates of award.

The exhibit must show in detail construction, equipment, management and results obtained. Each competitor must present a brief or report in printed form.

VI. The Hodgkins Fund Prize of $1,500 is offered by the Smithsonian Institution for the best treatise that may be submitted on "The Relation of Atmospheric Air to Tuberculosis."

The detailed definition of this prize may be obtained from the Secretary-General of the International Congress or Secretary of the Smithsonian Institution, Chas. D. Walcott.

VII. Prizes for Educational Leaflets:

A prize of $100 is offered for the best educational leaflet submitted in each of the seven classes defined below. In addition to the prize of $100, a gold medal and two silver medals will be awarded in each class. Each prize and medal will be accompanied by a diploma or certificate of award.

Competitors must be entered under assumed names.

A. For adults generally (not to exceed 1,000 words).
B. For teachers (not to exceed 2,000 words).
C. For mothers (not to exceed 1,000 words).
D. For indoor workers (not to exceed 1,000 words).
E. For dairy farmers (not to exceed 1,000 words).
F. For school children in grammar-school grades (not to exceed 500 words).

In classes A, B, C, D, E and F brevity of statement without sacrifice of clearness will be of weight in awarding. All leaflets entered must be printed in the form they are designed to take.

G. Pictorial booklet for school children in primary grades and for the nursery.

Class G is designed to produce an artistic picture book for children, extolling the value of fresh air, sunlight, cleanliness, etc., and showing contrasting conditions. "Slovenly Peter" has been suggested as a possible type. Entry may be made in the form of original designs without printing.

VIII. A gold medal and two silver medals are offered for the best exhibits sent in by any States of the United States, illustrating effective organization for the restriction of tuberculosis. Each medal will be accompanied by a diploma or certificate of award.

IX. A gold medal and two silver medals are offered for the best exhibits sent in by any state or country (the United States excluded), illustrating effective organization for the restriction of tuberculosis. Each medal will be accompanied by a diploma or certificate of award.

X. A gold medal and two silver medals are offered for each of the following exhibits; each medal will be accompanied by a diploma or certificate of award; wherever possible each competitor is required to file a brief or printed report.

A. For the best contribution to the pathological exhibit.
B. For the best exhibit of laws and ordinances in force June 1, 1908, for the prevention of tuberculosis by any State of the United States. Brief required.
C. For the best exhibit of laws and ordinances in force June 1, 1908, for the prevention of tuberculosis by any state or country (the United States excluded). Brief required.
D. For the best exhibit of laws and ordinances in force June 1, 1908, for the prevention of tuberculosis by any municipality in the world. Brief required.
E. For the society engaged in the crusade against tuberculosis having the largest membership in relation to population. Brief required.
F. For the plans which have been proven best for raising money for the crusade against tuberculosis. Brief required.
G. For the best exhibit of a passenger railway car in the interest of the crusade against tuberculosis. Brief required.
H. For the best plans for employment for arrested cases of tuberculosis. Brief required.

XI. Prizes of two gold medals and three silver medals will be awarded for the best exhibit of a workshop or factory in the interest of the crusade against tuberculosis. These medals will be accompanied by diplomas or certificates of award.

The exhibit must show in detail construction, equipment, management and results obtained. Each competitor must present a brief or report in printed form.

The following constitute the Committee on Prizes: Dr. Charles J. Hatfield, Philadelphia, *Chairman;* Dr. Thomas G. Ashton, Philadelphia, *Secretary;* Dr. Edward R. Baldwin, Saranac Lake; Dr. Sherman G. Bonney, Denver; Dr. John L. Dawson, Charleston, S.C.; Dr. H. B. Favill, Chicago; Dr. John B. Hawes, 2d, Boston; Dr. H. D. Holton, Brattleboro; Dr. E. C. Levy, Richmond, Va.; Dr. Charles L. Minor, Ashville, N.C.; Dr. Estes Nichols, Augusta, Me.; Dr. M. J. Rosenau, Washington; Dr. J. Madison Taylor, Philadelphia; Dr. William S. Thayer, Baltimore; Dr. Louis M. Warfield, St. Louis.

BOOK REVIEWS

A Manual of Personal Hygiene. Edited by Walter L. Pyle, A.M., M.D. (Third Edition.) *W. B. Saunders Company, Philadelphia,* 1907.

This book is already favorably known through its earlier editions. It occupies a unique position among works of medium size, dealing with this important subject. The books with which one naturally compares it are either frankly unscientific and meant for consecutive reading, like Curtis's epigrammatic "Nature and Health" and Gulick's "The Efficient Life," or designed especially for school use, like Hough and Sedgwick's "Human Mechanism." The volume in hand is rather a collection of articles by specialists to which one may refer for scientific but practical discussions of salient questions. Its tone is moderate and sane. The error of laying down many minute rules of personal conduct, a common characteristic of magazine hygiene, is wisely avoided. The values of optimism and of variety in occupation receive timely emphasis. We commend, especially, Dr. J. W. Courtney's section on the Hygiene of the Nervous System.

P. G. STILES.

Elements of Water Bacteriology. By Prescott and Winslow. (Second Edition.) *Wiley & Sons. Published* 1908. *Price,* $1.50.

Those interested in the bacteriological problems connected with the sanitary examination of water and sewage will welcome the second edition of this valuable work, which, though small, is so well arranged and so full of good material and suggestion that one does not regret its size. All medical health officers should have it on their shelves. Almost the last word on the interpretation of bacteriological water analyses will be found in it. Those teaching bacteriology, especially to medical students, will find useful information with reference to this important subject, which in the ordinary text-books on bacteriology is touched on only in a cursory and incomplete sort of a way.

The work is the product of practical workers on the subject, not compilers. They have not neglected the literature. They have gone into the depth of it and its richness is striking, and, what is more, their references are critical without being carping. The authors take their readers into their confidence, speak positively where they can justly, and point out the limitations fairly where these exist, and with all keep an open mind for the good things that must yet come.

They take up the method of water collection and of bacteriological counts, the significance of the quantitative results. They go over the various methods, "presumptive and conclusive," of the *B. coli* estimation with the significance of the same. They give a good chapter on the isolation of specific pathogenes that is refreshing, also a chapter on the significance of other bacteria usually taken as indicative of the sewage pollution of a water. Their chapter on the bacteriology of sewage and sewage effluents, though not extensive, is very good.

The book ends with a valuable appendix on "Media-Making" being an extract from the Report of the Committee on Standard Methods of Water Analysis of the American Public Health Association, 1905. In the course of the work they lay special stress on the necessity of a standard in this particular. The value of published work of this class is fully useful only when it is done after such standard methods, bacteria are such alterable creatures.

JOHN A. AMYOT

Sanitation of the Modern Home. Edited by Jno. K. Allen. *Domestic Engineering, Chicago,* 1907.

A suggestive guide to the architect and house owner in designing and building a residence providing a healthful, comfortable and convenient home.

The following list of chapters will give an idea of the scope of the book:

Chapter I, Selection of Building Site; Chapter II, Preparation of the Soil; Chapter III, The Ideal Home; Chapter IV, What the Modern Housekeeper Wants; Chapter V, The Cellar; Chapter VI, The Laundry; Chapter VII, Heating by Steam; Chapter VIII, Heating by Hot Water; Chapter IX, Heating by Warm Air; Chapter X, Ventilation; Chapter XI, Temperature Control; Chapter XII, Cold Water Supply; Chapter XIII, Hot Water Supply; Chapter XIV, Kitchen; Chapter XV, Bathroom; Chapter XVI, Lighting the Home; Chapter XVII, The Stable; Chapter XVIII, Electricity in the Modern Home.

This is a most excellent book of its kind. The authors of the various chapters are evidently well acquainted with the best practice and the whole book is written in a clear and forceful manner. Especially good are the chapters on heating, ventilation and plumbing. The last chapter gives one a very good idea of the uses of electricity, especially in heating and cooking. From a public health standpoint the title of the book is a little misleading. It would give one an idea that it was a work on hygiene, while really it is a description of modern methods for equipping a home "with a good system of cold and hot water supply, an inoffensive and sanitary system of disposing of household wastes, an adequate system of automatically controlled heating combined with ventilation, and a convenient and complete scheme of artificial lighting." All of these, of course, when well carried out may be attributes of a sanitary home, but a book with this title would naturally be more concerned, for example, with the quality of the water supply of the house than with the pipes and fittings used in its distribution. Generally speaking, the subject matter of the book is in accord with the best modern practice. It is, however, to be regretted that no mention is made of the danger of illuminating gas in sewers, as this is far more deadly than sewer air, which has been proved by many investigations to be as pure, if not purer than the air of the streets above the sewers.

In the chapter on lighting a little more might have been said on the effect of distributed light upon the eyes, as compared with light supplied from one or more centers of intense illumination.

In the chapters on plumbing there is a welcome tendency away from a multiplicity of traps and toward simplicity in design. It would seem to the reviewer, however, that a little more emphasis might be placed upon seat vents for closets, because they certainly contribute to the purity of the air in bathrooms and bedrooms to which they are attached. We see no reason why catch basins should be water-tight, provided the soil is porous and there is no danger of water leaching from catch basins to cellar. Again, there is no objection to the use of blind drains for rain-water leaders, provided a like precaution is taken.

The chapters on heating are very well written. The advantages and disadvantages of each system are described in a most judicial manner. No mention is made of ordinary stoves, which must necessarily be used by the majority of people, and the design of which might be improved upon very much.

The book describes many excellent ways of equipping a a healthful home, but a healthful home for those in quite comfortable circumstances. Many appliances, for example, low-cost shower baths, which are so cheap as to be within the reach of almost all, yet permissible from a sanitary standpoint, although somewhat deficient in appearance and convenience, might have been mentioned in the book. It has seemed to us that there has always been a lack of proper sanitary conveniences for the benefit of the impecunious many, rather than of refined appliances for the benefit of the wealthy few.

With these few comments and with the classification of the book among works on the sanitary arts, rather than among those on hygiene, we can heartily recommend it to all those concerned or interested in the proper equipment of the modern home.

R. S. WESTON.

Milk and its Relation to the Public Health. (*By various authors.*) *Hygienic Laboratory Bulletin No.* 41. *Government Printing Office, Washington*, 1908.

This Bulletin of 750 pages is a symposium by Trask, Lumsden, Anderson, McCoy, Stiles, Eager, Kastle, Roberts, Rosenau, Miller, Kerr, and Schereschewsky of the U.S. Public Health and Marine Hospital Service, Wiley, Mohler, Webster, Bolton, Melvin of the Department of Agriculture, and Dr. Wm. C. Woodward, Health Officer of the District of Columbia, with an introduction by Dr. Walter Wyman, head of the U.S. Public Health and Marine Hospital Service.

The articles relate to the present status of the milk problem from many standpoints, and treat of milk-borne outbreaks (typhoid, diphtheria, scarlet fever, tuberculosis, malta fever, zoo-parasites, summer diarrhœa); of the composition of ice cream, and milk; of the bacterial content of milk, and the presence of leucocytes; of the proper care of the cow, the securing of cleanliness, cold and rapid transit; of the proper classifications of market milk, with discussions of pasteurization, infant feeding and municipal regulation of milk supplies; and a series of tables, blanks, forms for inspection of dairies, and the statutes and regulations pertaining especially to the District of Columbia.

This symposium, curiously enough, is the outcome of the endemicity of typhoid in the District of Columbia, on which Government reports and investigations have been proceeding for years. Having eliminated water as a source of the Washington typhoid, by the elaborate and costly but certainly effective method of filtering all the water, and then observing that the typhoid fever remained at its old level, the Government proceeded to the investigation of the milk, and the rest of the country may well thank the long-suffering Washingtonians that their martyrdom, for Lo! these many years, has resulted, at least, in the production from the Government printing offices of a very fine text-book on milk — the application of one-tenth the contents of which, in practice, should have abolished this disgrace of the National Capitol a decade since. The professional hygienists have again demonstrated that an epidemiological diagnosis in the hands of experts does not require ten years and an immense investment to eliminate a single factor by a roundabout process, but that professional knowledge, commonplace enough to professionals, *and action*, may achieve the result in as many months.

The introduction reiterates the catchword, often emphasized in the last few years, that the factors of good milk are "cow, cleanliness, cold and quickness." A most interesting series of 260 milk-borne epidemics is summarized and tabulated by Dr. Trask, no doubt but a small fraction of those which have occurred. Dr. Lumsden points out the epidemiological features diagnostic of milk-borne typhoid outbreaks — an article well worthy of special attention by all health officers concerned in such outbreaks.

Dr. Anderson sketches the tubercle bacilli in the milk problem, indicating general use of the tubercular test for cows as the remedy.

Dr. McCoy deals with the milk-sickness, a disease of the human associated with drinking milk from cows suffering from the "trembles."

Dr. Stiles discusses, and eliminates as a practical factor, the probability of transfer of tapeworms, etc., through the milk supply, indicating the possibility, under some combinations of circumstances, of occasional transfer of some forms.

Dr. Eager gives some morbidity and mortality statistics relating to milk consumption.

Dr. Wiley indicates that "ice cream" is a term of indefinite application, to be interpreted only as meaning a frozen substance or mixture, without prejudice as to its contents. When it contains cream, milk or milk products, these should come from clean cows.

Dr. Kastle gives an exhaustive account of milk chemistry, including that of decomposed milks, a valuable contribution to the subject.

Dr. Rosenau treats of bacterial counts and standards giving the methods used in Washington. Reference to the Report of the Committee on Standard Methods of Bacterial Milk Analysis is conspicuous by its absence, and in considering the milk of other cities, no mention is made of any results later than 1904, although Boston and some other cities have contributed an immense number of examinations, exhaustively tabulated, since that date.

Dr. Rosenau and Dr. McCoy reach some valuable conclusions as to the so-called germicidal qualities of fresh raw milk, showing that it is weakly and variably antiseptic rather than germicidal.

Dr. Miller gives some conservative conclusions regarding the status of the question of leucocytes and streptococci in cow's milk, not markedly different from the general concensus of opinion amongst experts at this time.

Dr. Mohler lists and discusses as diseases of the cow injuriously affecting milk, tuberculosis, actinomycosis, botryonycosis, foot and mouth disease, anthrax, cowpox, rabies, mammitis, gastro-enteritis, "the trembles," and septic or febrile conditions. He considers also the origin of ropy, bitter, colored and bad-tasting or bad-smelling milks, and milks where the poison is derived from the food of the cow. Colostrum is said to produce diarrhœa, colic, etc., in those drinking it.

Sanitary inspection is described in detail by Dr. Webster, with many photographs and suggestions for reformation of existing conditions.

B. Meade Bolton describes in detail the important matter of proper water supplies for dairies and farms, and outlines the methods of examinations used and those dairies contributing to the Washington supply. A compact outfit for field bacteriological work is described. He concludes that few of the dairies or farms examined showed ideal conditions, but that in most instances simple methods would secure correction of the sanitary imperfections.

Mr. Melvin advises a recognition of the classification of milk which has grown up in the last few years; as certified milk (less than 10,000 bacteria per c.c.), inspected milk (less than 100,000 bacteria per c.c.) and pasteurized milk. He advises that all milk over 100,000 bacteria per c.c. should be pasteurized, and would not therefore admit the fourth grade, now quite widely accepted as marketable, *i.e.*, that under 500,000 bacteria per c.c.

Dr. Kerr considers at length Milk Commissions, Municipal Milk Depots, etc., giving the working constitution and rules of some existing commissions and advising official action on the subject.

Pasteurization is discussed by Dr. Rosenau, with the conclusion, apparently, largely based on statements of Theobald Smith, in this Journal, May, 1907, that pasteurization should be applied to all but the best grades of milk—a conclusion considerably at variance with most American, European and

English authorities, and yet to be tested in practice on a large scale.

Dr. Schereschewsky's article on infant feeding, in addition to other matter, deals at length with the same subject, pointing out that the dangers of scurvy or rickets from pasteurization are exaggerated, and easily offset in any case by associated diet or treatment with orange juice.

Dr. Woodward outlines the methods now in force for the supervision of the Washington milk supply, giving also their historical development.

In conclusion, we may characterize this Bulletin as a monumental aggregation of reliable information, contributing little new, but furnishing a most useful reference book, and summarizing on each subject what may be considered the "official view," although there is no claim made that it represents more than an effort to collect and publish data. Valuable advice is given, or may readily be deduced, and the whole is written clearly and concisely. It is probably the most important symposium on a public health subject from a public health standpoint yet issued by Federal public health officials, and as such is to be welcomed as a promise of good things to come as well as a good thing in itself. Inasmuch as it involves and is based upon a local study of Washington conditions, but uses this local material as an item in a broad study of interrelated questions, bringing to bear upon them the experiences of other places, it furnishes an excellent example to the local health officer of the value of local work, handled broad-mindedly and with reference to general principles as well as to immediate local needs—perhaps the most valuable of its lessons, excellent as the actual material published is in itself.

H. W. HILL.

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EDITORIALS

A FEDERAL DEPARTMENT OF HEALTH

THE Committee of One Hundred of the American Health League is a body of men and women bonded together as citizens to attempt the establishment in this country of a concerted, coördinate, deliberate scientific development of every agency for the betterment of physical well-being. The first step on the program attempted has been to focus upon the Federal Government all available influence to the end that a Federal mechanism, highly informed and powerful, may be officially set up as an essential part of the government of the people.

It would be hard to over-emphasize the importance of the subject, to over-praise the spirit behind the movement or to improve the methods of propaganda employed. The professional public hygienist cannot but approve the principles involved, and should he thankful that such a campaign is in hands so good.

Heretofore the relation of the professional public hygienist to this movement has not been defined. Propaganda, a powerful weapon, is often an unwieldy one, and cannot be trusted to hew always to the line. The professional hygienist will, therefore, welcome the announcement that Prof. Irving Fisher, the official leader of the movement, is expected t address the American Public Health Association meeting in Winnipeg, Aug. 25, 1908; affording the opportunity thus to adjust the professional and lay relations in a much-to be-desired coöperation, to discuss and to question. The committees appointed by the American Public Health Association to secure the establishment of Federal Departments of Health in all the governments of this continent (United States, Canada, Mexico and Cuba) may well embrace this chance to secure intelligent and powerful outside aid. We believe that this lay association is wholly sincere, well informed, progressive and energetic; and we believe that the position of professional public hygiene should be made clear, the relations of municipal, provincial and State officials to the proposed Federal department defined; and that those who, as practising hygienists, hold in themselves the great bulk of the learning and experience in public hygiene existent in this country, should decide now as they must, sooner or later, whither the movement is leading, and whether the paths selected promise thorns or roses. The professional public hygienist in actual practice of the intricate technicalities of his profession is a factor hardly yet recognized because he has not yet spoken. It is not yet time to speak, perhaps, but it is time to plan and prepare for speaking, when matters are ripe.

H. W. HILL.

HOW CAN PSYCHIATRY ASSIST PREVENTIVE MEDICINE?

The evils which follow insanity in the individual, and the heavy public and private burdens entailed by it upon every community, are well known. Next to alcoholism, insanity is probably the most potent cause of pauperism and dependence. Wherever insanity develops in a family of moderate means and the State does not interfere to lift the burden of support, wholly or in part, the tendency of that family is to poverty. Every person who has had only moderate experience in the care of the insane can call to mind instances where the expense of attempting to care for one insane member of a family who suffered from chronic insanity has eventually proved the financial undoing of the whole family, and has brought its members to poverty, if not to the almshouse. This material view of the relations of insanity to public and private well-being is not all. The distress and sorrow which fall upon other members of the family, and the influence of the insanity of one person upon other susceptible persons, are even more disastrous in their effects and a more far-reaching cause of loss to the community. It consequently is most desirable to utilize the experience of alienists to check the spread of insanity and to prevent its development among persons who have inherited or acquired a predisposition to mental disease. To this end it is desirable that the public should be instructed as to the character of heredity, until the knowledge becomes universal that every individual born into the world inherits the sum total of the vices and virtues, faults and perfections, strength and weaknesses, of remote ancestors, plus special morbid conditions or otherwise which existed among his immediate progenitors.

In the question of marriage, education and occupation the consideration of heredity seems forgotten or wholly ignored by the majority of people. People with neurotic heredities marry; they bring neurotic children into the world; they educate them faultily and in such a manner as to add to their neurotic inheritance; they allow them to choose unsuitable employments; and finally their children develop in their turn insanity. Much of the faulty educational methods at the present day spring from false ideas on the part of parents, and even teachers, of the value of knowledge as knowledge, and not as a training of the powers. It is not sufficient for neurotic persons to acquire knowledge alone; they should acquire with it a discipline which will help them to overcome the morbid and vagrant tendencies which spring from a neurotic organization. They should be trained to use their mental powers judiciously, to strengthen their wills and to build up their physical energies. They should learn that the process of education is not a cultivation of the memory merely, but a training of all the powers of the mind and body. The neurotic individual cannot, with safety, be subjected to the educational methods which may apply to the healthy minded. His training should not be so much stimulating as inhibitory. It should teach him to resist morbid impulses, to forego artistic pursuits, and to cultivate prosaic virtues and commonplace aims. Where a pronounced tendency to mental disease has been inherited it should be borne in mind that this tendency cannot be eradicated in a single generation, because the roots of the disorder are deeply hid, and further because the individual may represent the defects of several antecedent generations.

The neurotic individual can be more easily helped by proper education than he who inherits a tendency to insanity. A notoriously bad stock will eventually exhaust itself and run out. Psychiatry, therefore, should concern itself largely with questions of education. The prevention of insanity may be beyond us, but the proper education of the neuropath is always practicable. The object of education in this instance should be the formation of stable habits and the production of character. In every school the scholars in attendance should be most carefully instructed, and special educational methods should be devised for individual scholars. Education can never be a wholesale dealing with children, and every attempt to train children by wholesale or *en masse* is foredoomed to failure. Education and mental training, on the other hand, to be effectual must be applied to the individual and should be suited to his needs. The fact that many neurotic children are precociously bright, quick to imitate and often quick to learn, leads parents and teachers to stimulate them to acquire knowledge from books, and to omit the practical side of their training. They should rather have manual training and learn to associate knowledge with an ability to do something. They should realize that precept must be interpreted in terms of conduct. They must be drilled in routine methods until their wills become automatic, and orderly conduct and orderly thinking a second nature. Education as simply the acquisition of knowledge is more harmful than beneficial to such persons; education as a training of body and mind for systematic, orderly living is what they need. Hence the first requisite in any attempt to arrest the development of the neuropath into the psychopath must be the careful supervision of all scholars in the public schools by a trained expert. He should consult with teachers and make suggestions to them respecting any scholars requiring special care, and they should report regularly to him any scholars who attract attention by reason of any abnormal conduct. Cases of insanity have repeatedly developed in schools under the eye of teachers who were blind to symptoms which would have been apparent to the merest tyro in mental disease.

The formation of idle, pleasure-seeking or dissolute habits on the part of neurotic persons is most injurious. The gospel of systematic, orderly work for such persons, under skilled direction, needs to be preached to parents and teachers constantly until they are compelled to listen to it.

The education of the backward child also should be conducted under skilled direction, and the feeble mental energies of the individual should be fostered and developed by a well-considered training, instead of being destroyed by a vain effort to fit them into the activities of normal and healthy-minded children. The competition of the defective child with the normal child is disastrous to the former, and results in a condition of hopeless inferiority. If such children could be judiciously trained by skilled and sympathetic teachers a wall of habit might be built about them which would very effectually resist ever-present tendencies to mental degradation, and enable them to live useful and happy lives instead of degenerating into criminality, vice and misery, as too often happens.

The question of the need of expert advice upon the question of marriage with neuropaths, or persons who are hereditarily inclined to insanity, is also of extreme importance, but unfortunately beset with many difficulties, and the possibility of any effective solution is very remote. Marriage is not a question of the head but of the heart, and any attempt to control it upon a common-sense basis seems hopeless. The subject, however, should receive more careful attention on the part of educated men. One who has had an ordinary education and training should have learned the salient facts in reference to heredity before he reaches a marriageable age, and if he wilfully transgresses he should not have the excuse offered so many times for such unfortunate marriages, an absolute ignorance of the danger.

To render the teachings of psychiatry effective in preventing insanity I would urge, first of all, that an effort be made to teach in the schools the laws which control the healthful development of children and the dangers which accompany their violation. The dangers of the use of alcoholics should be taught in a rational, scientific manner, and their known effects upon the human system. The evils of sexual license upon the young should also be carefully and judiciously explained.

Another important agency for the instruction of the public should be the utilization of the labors of the Committee of One Hundred to spread abroad a similar knowledge of the laws of mental health in the weekly newspapers. The object of this Committee is to diffuse a knowledge of the laws of sanitation by a system of non-technical essays prepared by experts. The work is well organized, and it deserves the hearty coöperation of all sanitarians and alienists.

A third preventive measure is through the wider diffusion of special reports issued by the officers of institutions for the insane and defective classes. Generally such reports, although specially prepared for the instruction of the public, have a limited circulation or are smothered under a load of statistics and dreary tabulations. Effective extracts from these documents ought to be scattered broadcast among the people, so that they may know the essentials of healthy living and how to preserve health of mind as well.

A fourth measure, probably the most effective of all, should be a better recognition of the importance of psychiatry in the education of physicians. At present physicians are, as a rule, very imperfectly informed as to the early detection of mental disorders and the need of their early treatment, because they have not received adequate practical instruction during their courses of medical instruction. They may have listened to a few didactic lectures on mental disease, or may have observed a few of the more common types at a safe distance. They need, however, the same careful, systematic and well-arranged clinical instruction in mental disorders as in bodily diseases, and such instruction should be given in hospital wards where students may be brought into personal contact with the multifarious forms of insanity until they learn how to recognize and to treat them. The physician should know the danger signs in school children, and be equipped to give wise advice to parents and teachers. The relation of the family physician to the growing family is such that he is invariably consulted first whenever children display symptoms of failure under ill-considered and injudicious stimulation in school, and yet in practice how often does he belittle the danger or disregard the warning signs, not wilfully to be sure, but from an optimism born of imperfect knowledge and a willingness to shut his eyes to a painful truth.

HENRY M. HURD.

SCHOOL HYGIENE

The first number of a monthly bulletin bearing the above title has just appeared under the editorship of Dr. Geo. S. C. Badger of Boston. This new publication is issued under the auspices of the American School Hygienic Association, of which Dr. Henry P. Walcott is President, Dr. Arthur Cabot, Vice-President, and Dr. Thos. A. Story, Secretary and Treasurer.

Some of the articles contained in the June number are: "Report of Committee of Oculists and Electricians on Artificial Lighting and Color Schemes of Boston School Buildings;" "The Prevention of Tuberculosis among School Children;" "Eye Strain in School Children;" "The Ultimate Demands of School Hygiene;" "The Eyes of Public School Pupils;" "Department of Hygiene under Boards of Education;" "Playground Legislation;" "The Education of the Public in Scientific Medicine;" "Health of our High School Children;" "School Clinics."

Although containing but 14 pages of reading matter, the standard set by the first number of *School Hygiene* is a high one. The typography is good, the articles extremely readable and the general tone excellent.

As one of our editors, Dr. Durgin, was the originator of the idea of the medical inspection of school children, and the first to put it in practice, the American Journal of Public Hygiene naturally feels considerable interest in the new arrival. We extend a hearty welcome to *School Hygiene* and wish for it the success which it merits.

B. R. RICKARDS.

SPECIAL ARTICLES

THE DETERMINATION OF OXYGEN CONSUMED IN WATERS

By E. M. CHAMOT
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In view of the fact that the Committee on Standard Methods of Water Analysis of the American Public Health Association has called for reports relative to the methods in use for the determination of oxygen consumed in sanitary water examinations and the value of the data thus obtained in the interpretation of results, the writer presents the following notes in the hope that they may prove of interest and lead to the publication of the experience of other analysts.

Some fifteen years ago, as the result of much experimentation with different methods on various classes of waters, the following system of procedure was adopted in the Laboratory of Sanitary Chemistry of Cornell University:

Two hundred cubic centimeters of the sample are placed in a 400 c.c. Erlenmeyer flask; 10 c.c. of dilute sulphuric acid (1:4) added and from a burette standard potassium permanganate (1 c.c. = 0.0001 gram available oxygen) introduced very slowly, drop by drop. As soon as a permanent pink color results the burette reading is recorded, and the flask allowed to stand a few minutes so as to note whether decolorization will take place. The standard permanganate is again added until the total volume introduced is equal to 10 cubic centimeters, the flask is then placed over a Bunsen or ring burner (best if heated over the free flame) and brought as rapidly as possible to a boil. The boiling is continued for exactly five minutes, the flask removed, allowed to stand for one minute, the excess of permanganate carefully destroyed by standard oxalic acid solution (1 c.c. = 1 c.c. permanganate) and the permanganate again added until a trace of pink appears and persists for one minute. From the total volume of permanganate the volume of oxalic acid used is deducted.

In order that the results obtained may always be comparable an excess of at least 2 cubic centimeters must at all times remain.

Should the sample of water under examination destroy the 10 c.c. of permanganate during the boiling, more permanganate is added until a permanent color results. A new sample of the water is now taken and sufficient standard permanganate added to insure an excess of at least two cubic centimeters after five minutes' boiling; an additional 5 or 10 c.c. of the dilute sulphuric acid also being added.

Carried out in this manner the results obtained seem to be much more uniform than in most of the other modifications of this method; parallel determinations check and results obtained on different samples of water are comparable.

The points the writer considers of importance in this method of procedure are: (1) The slow addition in the cold to acidulated sample. (2) The addition of an excess of permanganate before boiling and the insurance that an excess will remain after the period of boiling. (3) The presence of a decided excess of sulphuric acid at all times. And (4) that a period of boiling for five minutes is sufficiently long to yield all the information the analyst needs.

The slow addition of the permanganate in the cold will cause the oxidation of nitrites, ferrous and manganous compounds, hydrogen sulphide, very easily oxidizable organic matter (usually putrefying animal matter) and unusual reducing substances. Many times this preliminary addition of the standard solution yields data of great value in the interpretation of results. Should the analyst wish an expression of the oxygen consumed due to stable organic matter, the amount of permanganate reduced at once in the cold is deducted from the total.

There appears to be no question that in any of the ordinary methods the organic matter present cannot be completely oxidized, even on very long boiling, and further that the amount oxidized bears no distinct relation to the total. As a rule, the analyst cares very little to know the exact quantity of very stable or resistant organic matter. The easily oxidizable unstable material interests him far more, and he can obtain all the information he wishes by boiling for not over five minutes. The writer is of the opinion that the period may even be shortened in all except very unusual cases. Long boiling unduly concentrates the sample, causes a decomposition of the permanganate irrespective of the organic matter, and renders the obtaining of comparable results difficult and ofttimes impossible. The same reasons hold good for the use at all times of as nearly as possible a constant excess of standard permanganate, for it is evident that concentration plays a very important part in the quantity of the reagent reduced.

Permanganate solutions of one-tenth the strength and also five times and ten times as strong have been tried, but in the hands of the writer have yielded results no better than those of the ordinarily accepted strength given above. Of standard reducing solutions tried oxalic acid proved most satisfactory, with ammonium ferrous sulphate as second choice. Permanganate solutions of the strength used (1 c.c. = 0.0001 gram oxygen) are permanent when made from distilled water redistilled from acidulated permanganate. Most of our manuals of chemical analysis state that solutions of this reagent lose strength and must frequently be restandardized. This is undoubtedly due to impure distilled water, for solutions may be kept even two years without appreciable deterioration, providing they are stored in the dark. For example, the solution used by the writer, prepared so as to have a strength of 1 c.c. = 0.0001 gram available oxygen, now eighteen months later gives a strength of 0.000094+ oxygen per c.c., a difference well within the limits of error.

It has been repeatedly shown by different investigators that the oxygen consumed corresponds closely to the color of the water; that all colored waters yield high oxygen consumed. It is also probably true that this determination gives chiefly a measure of the organic carbon present. These facts have led many water analysts to regard the data obtained by measuring the permanganate reduced by a water as of little or no value in the interpretation of results.

The writer is inclined to agree with this view so far as surface waters or sewage effluents are concerned, and perhaps with colored waters of all sources; but he is forced to change his view so far as ground waters are concerned.

The typhoid fever epidemic of 1903 led to the examination of thousands of samples of waters in the immediate neighborhood of Ithaca, and even to a certain extent throughout central New York. An opportunity was thus afforded of studying the value of the various determinations usually made in sanitary examinations of water and comparing the results obtained.

The results given by the surface waters accorded well with the opinion expressed above, namely, that in colored waters the oxygen consumed is high when the color is high, and that the data is of little value in guiding the analyst unless the water is colorless or nearly so, and the oxygen consumed is high. When, however, the analyses of the ground waters were studied there appeared to be a somewhat close connection between high oxygen consumed and high bacterial flora and low oxygen consumed and low bacteria. For comparison the ground waters were divided into two groups, those giving an oxygen consumed of less than one part per million, and those giving one part per million or over. These two groups were then averaged with the following results:

Number of Samples Averaged		Average Oxygen Consumed Parts Per Million	Average Number Bacteria Per c.c.
I	941	0.63	215
II	440	1.76	1,083

If from the group giving over one part per million we exclude those containing moderate amounts of iron, hydrogen sulphide or wood pulp, the average number of bacteria per cubic centimeter will be much higher and the difference will appear even more striking.

The bacterial counts as given are colonies on +10 standard gelatine incubated at 18° to 20° C. for forty-eight hours.

Many of our "dug" or "open" wells have chain pumps with wooden tubes and metal buckets. When these wood tubes are old the buckets often tear away a very finely divided wood pulp which gives rise to an exceptionally high oxygen consumed and may cause the analyst some concern unless he is familiar with the nature and history of the sample.

Doubtless even a greater variation in the bacterial content of the waters might be found were they classified into more than the two groups given above. No effort was made, however, to attempt any such grouping, since the task seemed too great. The results are presented as evidence that the determination of oxygen consumed in ground waters may prove, on further investigation, to be of considerable value, and to induce other analysts to report whether a similar relation between high oxygen consumed and high bacterial counts holds true for ground waters in other sections of the United States.

EFFECT OF HEATING UPON THE DETERMINATION OF LEUCOCYTES IN MILK

By H. L. RUSSELL and CONRAD HOFFMANN
University of Wisconsin

In the matter of examining milk for cellular elements, considerable emphasis has been laid on the method of examination. The two methods in vogue, (1) smearing the sediment on a glass slide, (2) the examination of the sediment in a blood-counting apparatus, have each had their advocates. In our experience we have found the latter method (Doane-Buckley) much the more accurate.

There are, however, other considerations that have heretofore been neglected that affect to a marked degree the accuracy of either method of examination. In studying the leucocyte content of raw and pasteurized milks one finds that the heated milks almost uniformly show a considerably larger number of cellular elements than the unheated product. Our attention was first called to this matter by Dr. B. H. Stone of the Vermont Laboratory, who inquired whether we had noted this condition in our leucocyte work.

A series of studies was made to ascertain the correctness of this observation, and the following results were obtained by the volumetric method on the same sample of milk from individual animals in a heated and unheated condition. The sample was divided and one portion heated to 70° C. The percentage increase or decrease of the heated sample is shown in the last column of the table.

TABLE I.

CELLULAR CONTENT OF HEATED (70° C.) AND UNHEATED MILKS

NUMBER OF COW	CELLULAR CONTENT PER C.C.		PER CENT OF INCREASE OR DECREASE
	Unheated	Heated to 70° C.	(Unheated as Standard)
7			
Fore	122,500	71,375	— 71.6
Middle	210,000	231,250	+ 10.1
Strippings	185,000	356.250	+ 92.5
32			
Fore	66,250	200,000	+ 201.8
Middle	178,750	297,500	+ 65.3
Strippings	356,250	625,000	+ 75.4
24			
Fore	101,250	77,500	— 30.6
Middle	55,000	41,250	— 33.0
Strippings . . .	160,000	117,500	— 36.1
Whole	62,500	81,250	+ 30.0
32			
Fore	272,500	335,000	+ 22.9
Middle	256,250	270,000	+ 5.3
Strippings	985,000	1,291.250	+ 30.0
Whole	247,500	288,750	+ 17.0
17	770,000	937,500	+ 20.7
11	500,000	701,250	+ 40.2
9	850,000	901,750	+ 6.0
45	137,500	117,500	+ 29.0
	96,250	102,500	+ 6.4
	132.500	131,250	— 0.9
46	56,250	53,750	— 4.6
	14,070	18,750	+ 33.3
	14,070	23,440	+ 66.6
47	18,750	18,750	+ 0.0
	4,690	12,500	+ 166.5
	6,250	4,690	— 33.2
48	462,500	520,000	+ 11.2
	253,750	357,500	+ 40.8
	388,750	387,500	— 0.2
26	3,125	12,500	+ 300.0
35	11,560	28,125	+ 143.3
34	25,000	72,500	+ 190.0
32	118,750	207,500	+ 74.7
7	82,500	203,750	+ 146.9
18			
Fore	370,000	681,250	+ 84.1
Middle	341,250	506,250	+ 48.5
Strippings	1,206,250	1,956,250	+ 193.1
24			
Fore	36,250	106,250	+ 193.1
Middle	50,000	45,000	— 11.1
Strippings	73,750	138,750	+ 88.1
24	133,750	135,000	+ 0.9
43	625,000	782,500	+ 25.2
18	632,500	741,250	+ 17.1
7	207,500	250,000	+ 20.4
18	656,250	781,250	+ 19.1
28	20,000	26,250	+ 31.2

TABLE I.—Continued

CELLULAR CONTENT OF HEATED (70° C.) AND UNHEATED MILKS

NUMBER OF COW	CELLULAR CONTENT PER C.C.		PER CENT OF INCREASE OR DECREASE
	Unheated	Heated to 70° C.	(Unheated as Standard)
41	113,750	153,750	+ 35.1
40	36,250	48,750	+ 34.7
9	479,375	800,000	+ 66.6
7	51,875	118,125	+ 127.7
17	724,075	1,281,250	+ 76.8
9	545,625	610,000	+ 11.7
43	253,750	254,375	+ 0.2
7	136,875	228,125	+ 5.9
32	52,500	75,000	+ 42.8
18	244,375	278,750	+ 14.0
11	193,750	316,250	+ 63.2
33	228,750	370,000	+ 66.1
24	48,750	172,500	+ 253.8

In sixty examinations here reported, fifty show an increased number of cell elements in the heated sample, and the percentage increase is usually so marked as to indicate, beyond all question, that the difference exceeds the usual limits of analytic error. In all but five cases where the heated sample showed less than the raw sample, the difference was well within the analytic error.

To ascertain the cause of this difference a series of samples was examined where they were heated at different temperatures ranging from 50° to 80° C. Thirty-one samples were thus examined with a determination of the number of cells in the raw milk as a control. Without giving the detailed figures here obtained, it was determined from this data that the most marked variation in cell content occurred between the temperatures of 60° and 70°. Not infrequently a marked difference was also found to exist between the unheated sample and that heated to the lowest temperature. The difference between the extremes of temperatures in favor of the heated sample was to be noted in every case but one.

The well-known change which occurs in pasteurized milk, whereby the fat globule clusters are broken down, is evidently associated with this change.* When milk is heated for ten minutes at 60° C. the creaming power is greatly diminished. The fat globule clusters are broken down and the butter fat is more or less homogeneously distributed throughout the milk serum. These fat globule aggregations rise readily to the surface, and probably entangle a good many of the cell elements; but with the more homogeneous emulsion of the fat, due to the action of the heat, the leucocytes are probably not enmeshed and are therefore free to respond to the action of gravity.

If this explanation is true, the cell elements in skim milk from whole milk allowed to cream perfectly ought to be less numerous than where imperfect separation occurs. On this point a series of examinations was made in which the milk of different animals was allowed to cream for 24, 48 and 72 hours respectively, after which an examination was made as to the leucocytes present in the whole milk, and also in the cream and the skim milk. Four tests were made for 24 hours, fifteen for 48 hours and six for 72 hours. The data obtained indicated that where the cream was allowed to rise completely, by far the larger proportion of the cellular elements was present in the cream, in spite of the fact that they were sufficiently heavy to fall to the bottom of the vessel if gravity alone were the only factor operative.

If the milk is previously heated, even the action of gravity is able to cause the sedimentation of a much larger number of leucocytes than is the case in unheated milk. The samples for this purpose were taken from five animals and portions of whole milk, cream and skim milk examined with and without previously heating. The marked decrease in the number of cells in the cream in every case and their accumulation in the skim milk indicate the effect of this physical condition.

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* Babcock and Russell, 13th Report, Wisconsin Experiment Station, 1896, p. 77.

To complete this study determinations were made upon the cell content of whole milk (raw and heated) and the supernatant cream and skim milk that are removed after the sedimentation of the leucocytes. In sedimenting the cell elements in the supernatant fluid removed by aspiration, water was used as a menstruum by which the leucocytes could be more effectually removed. The following data in Table II show the wide difference in per cent of all elements in the cream and milk after the first centrifugal process:

TABLE II.

CELL CONTENT IN HEATED AND UNHEATED WHOLE MILKS AND SUPERNATANT LIQUID AFTER FIRST PRECIPITATION

TREATMENT OF MILK	LEUCOCYTES PER C.C.		
	Whole Milk	Supernatant Cream and Skim Milk	Per Cent of Original Number in Whole Milk Found in Supernatant Liquid
Unheated	529,375	12,500	2.3
	589,375	62,500	10.6
	723,125	28,125	3.8
	319,375	29,690	9.3
	548,500	37,970	6.9
	228,750	25,000	10.9
	197,200	92,500	46.9
	365,625	26,250	7.1
	271,250	137,500	50.6
	12,875	9,375	72.0
	12,500	7,340	58.7
	280,000	77,500	27.6
	338,125	100,000	29.5
	625,000	46,875	7.5
			Av. 24.5%
Heated to 70° C.	200,000	6,250	3.1
	297,500	25,000	8.4
	625,000	26,250	4.2
	782,500	20,315	2.6
	413,750	25,000	6.0
	268,750	3,125	1.1
	638,125	21,875	3.4
	386,875	21,250	5.4
	825,625	9,375	1.1
	634,375	14,840	2.3
	638,125	9,375	1.4
			Av. 3.54%

These determinations leave no doubt but that many of the cell elements in milk are not recovered in the sediment produced by centrifugalization under customary conditions. Any method where the loss varies from 2 to 70 per cent due to the effect of a single factor is open to serious objections. Such criticism cannot be urged in the case of the heated milks, as an analysis of the same factor of loss here reveals an average of about 3.5 per cent with a range, as indicated, from 1.1 to 8.4 per cent.

To show how small the analytical error in duplicate examinations of heated milk samples is, the following data from our records are herewith appended:

Table III.

CELL CONTENT OF DUPLICATE SAMPLES OF HEATED MILK (70° C.)

NUMBER OF COW	FIRST EXAMINATION	SECOND EXAMINATION	PERCENTAGE VARIATION
7	72,500	71,250	1.7
11	263,750	270,000	2.3
11	616,250	660,000	7.1
17	391,250	382,500	2.2
17	812,500	838,750	3.2
9	643,750	625,000	3.0
9	635,000	641,250	1.0
19	1,316,250	1,316,250	0.0
11	522,500	513,750	1.7
41	2,506,250	2,518,750	0.5
9	868,750	863,750	0.5
18	395,000	382,500	3.2
17	656,250	653,750	0.3
8	166,250	187,500	12.7
37	58,750	53,750	9.3
38	65,000	61,250	6.1
42	1,697,500	1,695,000	0.1
13	15,625	15,625	0.0
35	123,750	122,500	1.0
33	306,250	312,500	2.0
18	435,000	432,500	0.5
9	1,702,500	1,715,000	0.7
			Av. 2.7%

These unselected results, taken from our regular determinations, certainly indicate as consistent records as could be desired.

It would appear from the foregoing data that in determining the number of cell elements in milk it is advisable to subject the material to an initial heating to a point where the creaming power of the liquid is broken. A momentary exposure at 70° C. or above, or a more prolonged heating for a few minutes at 60° C., will so alter the physical arrangement of the fat globules in milk that practically all of the cellular elements may be recovered. Such an improvement in technique is to be regarded as advisable in conducting studies on the cellular content of milk.

DIPHTHERIA DIAGNOSIS

By BURT RANSOM RICKARDS, S.B.
Director, Bacteriological Laboratory of the Boston Board of Health

The peculiar morphology of the diphtheria bacillus, together with the considerable amount of variation in both morphology and staining, would in itself have made this organism one of great interest to bacteriologists aside from its importance as a pathogen. These peculiarities usually deceive the beginner into believing that diphtheria diagnosis is one of the easiest of the routine procedures of public health laboratories, but the illusion is not lasting.

The responsibility resting upon the bacteriological diagnostician is always a heavy one, his decisions being of vital interest, financially and socially, to the patient and his associates, and sometimes bearing almost the relation of a death sentence or a pardon. To a greater degree than usual is this true of diphtheria diagnosis, since so much more depends on an early diagnosis, from both the standpoint of treatment and isolation.

The bacteriological diagnosis of diphtheria is in the vast majority of cases based entirely upon the morphology and staining reaction of the organism. Only in exceptional cases is there time, opportunity or necessity of biochemical tests being made. Prior to the work of Wesbrook on the "Varieties of *B. diphtheriæ*" and the subsequent work by the Committee on Diphtheria in Well Persons under the auspices of the Massachusetts Association of Boards of Health, there was undoubtedly much greater diversity of opinion as to what constituted true diphtheria bacilli than exists today. It is probably not expressing it too strongly to say that the

A, C and D types of Wesbrook are now universally accepted in the best laboratories as absolutely typical. When we get beyond these types, however, there is liable to be a great difference of opinion as to the weight to be placed on the morphological evidence presented; and there thus enters still a not inconsiderable amount of the personal element. Moreover, one is apt to be influenced to a greater or less degree, consciously or unconsciously, by other factors, such as the physician's diagnosis, the clinical signs indicated by him, or possibly by the immediate environment of the patient, as, for instance, when the patient is an inmate of an institution. It is on some of these points that the writer wishes to enlarge.

TYPES TO BE CONSIDERED IN CULTURES FOR DIAGNOSIS.

Since the subject of this particular paragraph has been most thoroughly covered in a recent publication,* and is to be dealt with in a paper before the Association at this meeting, I do not propose to go into the question in any great detail.

Suffice it to say that the writer agrees, in the main, with the article referred to; that he makes a diagnosis of positive on A, C and D forms, that the presence of A_1, A_2, B_1, B_2, C_1, C_2 and E forms are regarded as atypical and another culture requested of the physician, usually with the added statement that "suspicious organisms are present." The other diphtheroid forms are thought worthy of note only in very exceptional cases. To the above should be added the statement that if the A, C and D types are found in only very small numbers, experience has taught that a doubtful report is the wisest course, since such cases, if due to the presence of a very small number of diphtheria bacilli in the throat and not to other causes, often clear up in twenty-four to forty-eight hours, in which case the family is saved the great annoyance of quarantine. Also that when the culture shows absolutely no other forms than A_1 or than C_1 this has invariably on further incubation proved to be true diphtheria, that is, A's or C's have developed. Such cultures are now regarded as positive, but are in fact very rare.

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* Am. Journal of Public Hygiene, Vol. XVII, page 156.

Since a single negative is inconclusive in the face of good clinical evidence, it has been the policy of our laboratory, from the first, to request a second culture in all cases where the physician indicates the clinical diagnosis to be diphtheria or where membrane is reported present on pharynx and tonsil or larynx. Such requests are as a general rule respected, especially if the condition of the patient remains the same as when the first culture was taken or if the symptoms increase.

Of course it is often possible when atypical forms are present to obtain definite positive or negative evidence by isolating the diphtheria-like organisms in pure culture, or by secondary cultures made from the original. Such a process can hardly be carried out as a routine procedure except in those laboratories where the technical force is large in proportion to the amount of work A further question of importance on which lack of time forbids discussion is in regard to the types to be considered positive on swab examinations and five-hour incubations.

TYPES TO BE CONSIDERED IN CULTURES FOR RELEASE.

Is not a bacteriologist justified in placing more stress on the types A_1, A_2, B_1, B_2, C_1, C_2 and E when such types are found in cultures for release than when found in diagnosis cultures? With cultures for diagnosis, a positive report means to the patient either the diphtheria ward of a hospital for contagious diseases or the inconvenience, trouble and expense of an isolation at home. The physician should feel confident that the laboratory will give a positive diagnosis report only on absolute typical forms. In release cases, however, we have the clinical evidence of the virulence of the organism. Here it would seem as if positive reports on the atypical forms mentioned are occasionally justified, since such a decision need mean, in cities at least, only twenty-four hours before another culture could be reported on, — a slight hardship, perhaps, but justifiable when one considers that the patient if released prematurely might infect others, against which possibility the extra hours of isolation become insignificant. In long-continued cases virulence tests offer a ready means of release, if the organism proves non-virulent.

THE PERSONAL ELEMENT IN DIPHTHERIA DIAGNOSIS.

Wesbrook, in his "Varieties of *B. diphtheriæ*," says: "A complete description of the various factors taken into consideration by a bacteriologist in arriving at a diagnosis is almost an impossibility. Account is taken of size, relation of thickness to length, irregularity of shape and staining reaction, and relation of the bacilli to each other (*i. e.* arrangement).

" These various points probably appeal to different laboratory workers with unequal force, and it is conceivable that one observer is willing to include certain bacterial forms as diphtheria bacilli, because they show polar granules, whilst to another their departure from his recognized limits of shape, size or arrangement prevents such inclusion. Or, conversely, arrangement or relation of the bacilli to each other appeals so strongly to one person that he recognizes certain forms as diphtheria bacilli, which to another are of such a size or shape, or display such staining characteristics as to be ineligible for such classification.

" Whilst in routine initial examinations of clinical cases it is probable that the percentage of disagreement in diagnosis between people accustomed to such work is small, in later examinations of the same cases for release from quarantine, and in the investigation of diphtheria-like micro-organisms derived from healthy throats, noses or other sources, there is room for greater diversity of opinion."

Where two or more men are employed on the technical staff, a large amount of the personal element may be eliminated by having two or more men examine the slides. In the writer's laboratory two men examine the smears, a third man being called upon in all cases of difference of opinion. This method has the added advantage of keeping each man, by constant practice and the mental stimulation from oversight, up to his highest working efficiency.

INFLUENCE OF CLINICAL AND OTHER FACTORS.

If a bacteriologist is in possession of information bearing on the clinical diagnosis or the clinical symptoms, does not such knowledge, unconsciously perhaps, bias the judgment in those cases where the atypical forms are near the border line? To guard against whatever element of truth there may be in this point, it has been the practice of our laboratory to have the diagnoses made and read off to a person marking the cards before such evidence is seen by the diagnostician, who knows only whether the culture is for diagnosis or release.

In a previous paper* the writer discussed conditions which might occur which might render a correct laboratory report contrary to the apparent clinical facts of the case. The points then considered were, with one exception, those which might arise outside the laboratory and for which the laboratory would in no way be responsible. Certain laboratory factors, however, may tend to give results which, while correct in themselves, are contrary to the true clinical facts.

A. DELAY IN INOCULATING SERUM.

Observations made on only a very small number of cases have led the writer to believe that where swabs taken from true diphtheria cases are forwarded to the laboratory, without having been inoculated on serum, a negative result is more liable to be obtained than when the serum is inoculated immediately. This opinion is, it is true, based on but slight experimental evidence, but as it is customary in some laboratories where specimens are received from a distance to furnish swabs only to the physician, this point seems worthy of further consideration.

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* Trans. A.P.H.A., 1905, Vol. XXXI, Pt. I, page 349.

B. EFFECT OF METAL SWAB WIRES ON GROWTH.

Does not the metal of the swab wires exert an influence on the growth of the diphtheria bacillus if allowed to remain long in contact therewith? The writer and his assistants have noticed repeatedly that where physicians, contrary to directions, have allowed the brass swab wires to remain in contact with the serum, a scanty growth has resulted and in a number of cases negative results been obtained where subsequent cultures, properly handled, have proved positive.

C. INFLUENCE OF THE TIME OF INCUBATION.

It is an unquestioned fact that from five to fifteen hours is usually sufficient incubation for the development of *B. diphtheriæ* in routine cultures. From some personal observations, strengthened by the observations and opinions of Denny, the writer believes that in some cultures where the diphtheria bacillus is perhaps originally largely outnumbered by other non-antagonizing or symbiotic organisms from twenty-four to forty-eight hours may be necessary for the diphtheria bacillus to overcome its unfavorable environment and assume a typical form. This may also be due, as Denny suggests, to auto-intoxication on the part of the rapid growers, finally giving the diphtheria bacillus a chance to develop.

On the other hand, it is sometimes, though not often, the case that typical diphtheria bacilli found on five-hour serum growths are entirely overgrown by antagonizing organisms if kept in the incubator over fifteen hours (to wit, the overnight plus the five-hour incubation), while cultures made from the positive five-hour growth on fresh serum will show true diphtheria bacilli at the end of the fifteen-hour period.

VIRULENCE TESTS.

During the past winter, diphtheria in Boston has been in general of a rather mild type. This has naturally led to a large increase in the number of "bacteriological cases" with a corresponding increase in the number of requests for virulence tests. In a number of instances it has been noticed in making such tests that different colonies from the same original culture have varied greatly in virulence. If this had not repeatedly occurred it would be natural to ascribe such varying result to a difference in the resistance of the guinea pig, but similar results on pigs from varying sources leaves the question an open one.

INTERPRETATION OF RESULTS.

As this topic has been admirably treated in articles published by Hill and others, it is not my purpose to more than mention it here. In brief, the laboratory report should be an absolutely accurate report of what is found after the specimen has been treated according to the very best technique possible. The physician should, but often does not, appreciate that a single negative is inconclusive and that an absolutely accurate laboratory diagnosis may be at variance with the clinical evidence for the following reasons:

1. Through faulty technique on the part of the physician.
2. Through exceptional vital resistance on the part of the patient.
3. Through low virulence of the organism.

In conclusion, the problems suggested in this paper are, as you are well aware, but a small part of those with which the worker in this field has to deal. Hoag's *Bacillus X* has been met with during the past winter in many ear cultures, often pure, sometimes associated with *B. diphtheriæ.* A culture containing this organism is often most puzzling and might even be regarded as positive unless one was thoroughly familiar with the points of differentiation. This organism and the other so-called pseudo-diphtheria forms deserve a great deal more study. Both in organization and technique in diphtheria diagnosis and in the other lines of diagnostic work there are many problems to be attacked and a need of greater uniformity in present methods.

In view of the success attending the efforts of the Technical Committee on Water and on Milk to secure standard methods of procedure, I would move, if in order and in accordance with the provisions of our constitution, that a Technical Committee be appointed on Diphtheria Diagnosis, to consider the subject from the various standpoints of organization, coördination, technique and interpretation of results.* The method of appointment and the number of members I would leave to the Chair, but would suggest the advisability of having the Committee as fairly evenly divided as possible between State and municipal officials, in order that the various conditions met with, in these two branches of the service, may receive due consideration.

In other branches of diagnostic service there is also more or less need of similar work. I would suggest to the Section the value of having committees appointed to consider such subjects as Tuberculosis, Typhoid, Glanders, Rabies and the like, and such new work as *Spirochæta pallida*, the Conradi-Drigalski method of diagnosing typhoid, etc., with the object in view of securing uniform methods, investigating new methods, discussing the interpretation of results and in general coördinating the whole service.*

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* Action taken as indicated in the Report of the Committee on Technical Progress; this Journal, Vol. XVIII, page 168.

THE MATHEMATICS OF THE BACTERIAL COUNT*

By H. W. HILL
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The use of bacterial counts, for the comparison of different degrees of purity in water supplies, for tests of water filters and in various quantitative determinations of bacteria in other fluids, has been overshadowed in importance of late by the use of bacterial counts in estimating the relative purities of milk supplies.

The bacterial count in water was first looked upon as affording an index to the purity of water, and the attempt was made to determine a standard. This attempt was found difficult and, notwithstanding that bacteriologists draw inferences from counts which they find of the greatest service, a standard for the purity of public water supplies has never been generally accepted. A standard for filtered water, however, has frequently been used, sometimes based on the percentage purification obtained, sometimes on a specified figure, sometimes on both.

A great many of the technical difficulties existing at the time when a bacterial standard for water was first chiefly discussed have been overcome since. Standard methods of collecting, plating and counting bacteria have been evolved, with an immense development of detail. The question of standards of bacterial purity for various types of public water supplies might now be revived with a fair chance of reaching some decision. But, meantime, the pure milk question has resulted in the establishment of arbitrary standards, based, not on an attempt to establish what is to be regarded as purity, but to fix a limit on what must be regarded as impurity. The standard sought for water was the maximum which might be allowed without danger; that for milk, the minimum that might be secured without suspending the milk trade. The establishment of a standard of maximum impurity for milk has been a much more simple task than the establishment of a standard of minimum purity for water.

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* Read before the Laboratory Section, American Public Health Association, at Atlantic City, September 30, 1907.

But, although the standardization of manipulative technique for securing uniformity of bacterial counts has been accomplished, the calculation of the counts, which is quite equally important, is left an open matter. The standard technique of "plating for bacterial counts" involves the use of 10 c.c.'s of medium, spread evenly in a four-inch (10 c.m.) petri dish. To this is added 1 c.c. or simple fractions thereof of the liquid containing the bacteria to be counted. These specifications are based on the best accepted practice and may be regarded as theoretically sound and practically useful, so far as manipulation goes. *A priori*, it might be supposed, and the earlier bacteriologists evidently did suppose, that plates thus prepared would indicate reasonably accurately the total number of bacteria present in the material tested, at least of those varieties which would grow under the conditions (media, temperature, humidity, and length of incubation) imposed, *without regard* to whether the number of such bacteria present were few or many, *i.e.*, that 1 c.c. of water, milk, etc., containing 100 growable bacteria would, when introduced into a plate, yield 100 colonies per plate, while 1 c.c. of water, milk, etc., containing 10,000 growable bacteria would yield, when introduced into a plate, 10,000 colonies per plate. I shall endeavor to show that this is entirely fallacious and to urge the true status. It is not a new subject. I first urged it with regard to water, 1897.* Jordan, of Chicago, independently urged the same in 1899.† But it has not yet been generally recognized in practice.

The physical difficulty of making counts on plates containing large numbers of colonies induced the earlier bacteriologists to plate fractions of a c.c. rather than whole c.c.'s, when they suspected the material to contain high numbers of bacteria, in order to reduce the actual colonies per plate sufficiently to make counting easy. So long as this object was secured, no attention was paid to the overcrowding of the plate as a factor in the count. Counts were still reported from plates containing many hundreds of colonies, or even thousands. Indeed, much ingenuity has been expended to devise various forms of colony counters, with the express object of permitting accurate counts to be made in plates, containing great numbers of colonies, without any suspicion that the counting of such plates at all was radically wrong, and when protests against finicky accuracy in high counts were made, they were based merely upon the fact that close accuracy was not physically possible, and not important if accomplished, rather than upon any suspicion that a biological fallacy existed. It was found later, however, that a curious discrepancy existed between the calculated counts obtained from successively diminishing fractions of the same material. Thus, on plating a decimal series of fractional parts, results such as the following might be obtained:

	STRAIGHT	1/10	1/100
Actual count	7,000	1,000	150
Calculated count, 1 c.c. . .	7,000	10,000	15,000

This discrepancy was recognized as existing; of course, all these figures on the same c.c. of water could not be correct, and various explanations were offered. There were two methods of securing the fractional parts of 1 c.c. for plating; one consisted in using a pipette graduated to tenths or hundredths and so measuring the actual fraction of the original which it was desired to plate. The second method, now generally conceded to be much more reliable than the first, and now almost universally adopted in practice, is that of adding to 1 c.c. of the original material 9 or 99, or other amounts of sterile water, and then plating 1 c.c. of the mixture, attaining the same end by a different process. Those who followed the dilution method explained the discrepancy in counts above described as due to the breaking up, in the process of dilution, of chains or groups of bacteria, which thus yielded as many colonies in the dilutions as the portions into which they were broken; while in the original plate made directly from the sample each chain or group, being unbroken, yielded only a single colony. A number of objections to this hypothesis can be made.

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* Report on Brooklyn Water Supply, 1897. Hill and Ellms.

† American Public Health Association Transactions, 1899.

1. There is little evidence that chains or groups occur in water to any such extent as would account for the uniform occurrence of the discrepancy noted.

2. Chains and groups do occur in milk and in sewage, but they are broken up with considerable difficulty, and the manipulations incident to dilution are not sufficient to notably disintegrate them. (Rickards.)

3. If the original sample as well as each successive dilution be handled with equal severity of manipulation, shaking each violently twenty-five times, for instance, the discrepancy remains unaffected.

4. If the dilution processes alone caused the discrepancy, no discrepancy should be found in the direct fractional measurement of plating. But such discrepancies are found in both methods.

5. If the discrepancy depended on breaking up of chains or groups, it should be most marked in the plating of pure cultures of streptococci, sarcinæ, etc., and least marked in

the plating of cultures of organisms such as *B. prodigiosus*, which show no great tendency to chains or groups. But the discrepancy in both cases is practically the same, showing no relation to these factors.

Hence it is entirely fair to conclude that the breaking up of chains or groups is not a factor in the discrepancy between successive dilutions. In endeavoring to account for the discrepancy (a problem set before the writer by Mr. Geo. W. Fuller, in the course of the Louisville Water Filtration Experiments, in 1896), the writer observed that in successive dilutions made from pure cultures, *i.e.*, *B. prodigiosus*, not only was the numerical discrepancy parallel with that found in plating mixed cultures, as those, *i.e.*, from water, but that the actual size of the individual colonies increased in proportion as the dilutions rose: *i.e.*, in a plate containing 3,000 colonies, the colonies were very small; in a plate containing half a dozen colonies, the colonies were relatively very large. Of course, the same is true in mixed cultures, but in pure cultures it is extremely obvious. This suggested that the discrepancy was due chiefly to overcrowding. Routine work on water, done in two dilutions, was assembled and examined. It seemed obvious that if overcrowding were the chief factor, the greater the overcrowding the wider would be the discrepancy, and that if there were no overcrowding there would be no discrepancy. This was entirely substantiated by results which are quoted in the Report of the Brooklyn Watershed Laboratory in 1897; by Jordan, in the A.P.H.A. Trans. in 1899, and by many others, notably in the Appendix of the report of our Section Committee on Standard Methods of Bacterial Milk Analysis. (Am. Jour. Pub. Hyg., Nov., '07.)

It will be noticed that the higher the actual number of bacteria in the original sample, the greater the discrepancy between the plates made from the sample, and those made from dilutions of the sample. Anyone who chooses to do so may make tables for himself and so reproduce this work.

He will quickly convince himself of its truth and will also demonstrate that if the original sample contains not over 200 bacteria, successive higher dilutions will check with it, showing that 200 bacteria will grow in a plate without introduction of those factors of food exhaustion or direct antagonism, which we place together under the term overcrowding. Some results seem to show that 100 colonies per plate is the limit for milk, but this remains to be confirmed.

So far the writer has offered nothing practical to justify reference to this subject. The real reason for calling attention to it at this time lies in the fact that it is becoming a matter of serious public health interest that bacterial counts made in different laboratories should be made not alone with the same technical methods, *but also with uniformity of calculation.* If not uniformly calculated, uniformity in technique is of no advantage whatever. The weight given to the bacterial count in the production of certified and inspected milk, and in the bacterial supervision of market milk, makes it very essential that two laboratories engaged in examining the same milk should at least approximate the same results. This is quite impossible, notwithstanding uniformity in technique, if practically identical counts be calculated and recorded by different methods. To illustrate from actual practice: of two laboratories examining the same milk, one reported that the counts pretty uniformly approximated 10,000 per c.c. while the other reported pretty uniformly counts ranging in the neighborhood of half a million. Thus one laboratory would have approved this milk for certification, while the other would have condemned it utterly on the standards for both certified and inspected milk, and would have rejected some of it, at least, even as market milk.

Investigation showed that no serious discrepancies in methods, technique or media existed, in fact, both laboratories used the media made in one of them. Finally it was discovered that the laboratory securing the high counts had diluted the milk to one in 10,000, while the laboratory securing the low counts did not dilute at all, but plated a whole c.c. of the milk itself directly. This latter laboratory did not and indeed could not get counts much over 10,000, because usually 10 c.c.'s of agar in a four-inch petri dish will not develop much more than about this number of countable colonies. Had they plated the milk diluted 1 to 10, the highest count they could have secured from any milk would have been approximately 100,000 of the same 10,000 colonies per plate.

This is not at all an extreme case; it illustrates the principle, at the same time pointing out the enormous errors in practice which may result from negligence or ignorance of what after all is an extremely simple and obvious point.

I do not know how many methods of calculating bacterial counts there are in existence, but there are three which I have seen in use, all of which are good, so long as they are applied to plates containing not over 200 colonies, but the first two of which yield entirely fallacious results when applied, as they are very likely to be, to plates yielding other numbers of colonies.

The first consists in calculating out, for each dilution made, the total bacteria per c.c., and them averaging the results by adding all the totals and dividing by the number of dilutions.

The second consists in adding the actual counts of colonies from the different dilutions and averaging by dividing by the total of the fractional parts of a c.c. plated in each case.

The third consists in regarding as reliable only the not overcrowded plate, whichever that may be; recognizing it in the fact that the count lies between 40–200, ignoring all others.

To illustrate: Suppose that a milk sample, which we will assume actually contains 2,000,000 bacteria per c.c., is plated in a decimal series of dilutions thus:

1 c.c. 1/10 1/100 1/1,000 1/10,000

The number of bacteria actually put into each plate will be

2,000,000 200,000 20,000 2,000 200

The number growing in each plate will be in round numbers somewhat as follows:

10,000 9,000 6,000 1,400 200

The number calculated as present in 1 c.c. taking each dilution by itself will be:

10,000 90,000 600,000 1,400,000 2,000,000

The number reported, by the first method of calculation, above described (*i.e.*, averaging the calculated counts from each dilution), would be 820,000; by the second method (dividing the total actual count by the fractions of a c.c. plate) would give:

$$\frac{10{,}000 + 90{,}000 + 6{,}000 + 1{,}400 + 200}{1 + 1/10 + 1/100 + 1/1{,}000 + 1/10{,}000}$$

or

$$\frac{26{,}600}{1.1111} = 24{,}000.$$

The third method will yield 2,000,000, or the correct count, as assumed. It will be remembered that the actual number present was 2,000,000 by hypothesis. Hence these methods of calculation give results of 820,000, 24,000 and 2,000,000, all from the same actual counts, one being about 1/3, the other about 1/90 of the actual number, the last being pretty close to the true figure.

Thus the real solution of this problem is very simple. If from the above actual counts all be eliminated except that lying at or below 200, the correct count is at once had. The counts from the other dilutions are simply neglected as overcrowded and hence of no value, except in so far as their increasing disparity as the scale of dilution is descended forms a consistent whole with the result recorded.

It will readily be seen from this example that if three different laboratories used the same technique, and plated a milk containing actually from 100,000 to 200,000 bacteria per c.c., the calculated results might easily be such that one laboratory would approve the milk for market purposes only; the second would approve it for inspected milk but not for certification, while the third laboratory would approve it even for certification, all using identical methods and standards, except that of calculation of count.

It will be said that this is exaggerated, that in practice milks would not be plated in so many dilutions and that, therefore, in practice the laboratories concerned would report much more closely uniform results than those here suggested. It is quite true that I have so handled the figures as to bring out the results of applying logically the principles used in such a manner as to show them at their worst, but this is nothing more than the *reductio ad absurdum*, which is a perfectly logical and proper weapon.

It is only right to point out that extremely low counts are also unreliable. In the foregoing examples, had a dilution of 1/100,000 been made on the milk containing 2,000,000 bacteria per c.c., while 20 colonies would be the proper proportion per plate, it is unlikely that any one plate would yield this count, except by the merest accident. The average of several duplicate plates, however, at this dilution would be about 20, the individual plates ranging from 10 perhaps to 35 each. So if the 1/1,000,000 dilution had been made, it would be mere accident if a single plate yielded the proper count of 2. An average of many duplicates would range from 0 perhaps to 10 colonies, averaging about 2.

The unreliability of extremely low counts is due first to the purely physical difficulty of distributing a small number of bacteria equally in several c.c.'s of water, and second to the purely physical difficulty of so equally extracting from the water one c.c. as to leave the equal distribution undisturbed. With larger numbers of bacteria distributed in the same amount of water, these physical difficulties practically disappear, so that plates showing from 40–200 colonies are quite representative. On this ground, dilution should be by fifths rather than tenths, since proceeding by fifths any possible number must fall, in some plate, between 40 and 200.

To summarize:

I. Plating should be so done as to secure from 40–200 colonies per standard plate.

1. In order to have a number of colonies not too large to count completely.

2. In order that the size of the colonies may be large enough apart to facilitate isolation, if this be desired.

3. In order that the colonies may be large enough for ready appreciation by the eye.

4. And chiefly, because the standard plate, containing the standard 10 c.c.'s of standard medium, will not support more than about 200 colonies without detriment to the weaker forms.

II. In order to secure 40–200 colonies per plate, dilution by fifths instead of tenths is the logical method; but dilution by tenths gives results sufficiently close in practice. In general, for certified milk, dilutions of 1/100 should be made, giving a range of accuracy from 4,000 to 20,000; for inspected milk, dilutions of 1/1,000, giving a range of 40,000 to 200,000; and for market milk, 1/10,000, giving a range of accuracy from 400,000 to 2,000,000. When working to determine the actual count in an unknown milk, rather than to determine if a milk is above or below a certain standard, all three dilutions should be used, and the result selected should be that which gives 40–200 colonies to a plate. Straight or one-tenth counts on milk are rarely required, because few milks run low enough to make the counts at these dilutions accurate.

III. With water, dilutions of straight (or 1 c.c.) and of one-tenth, giving together a range of accuracy from 40–2,000, are usually sufficient. Unless highly polluted, dilutions of 1/100 on water rarely give counts within the limits of reliability (40–200).

IV. With sewage, the dilutions used for market milk can usually be counted on to yield satisfactory results, *i.e.*, 1/10,000, giving a range from 400,000 to 2,000,000; but it is safest to plate also at 1/100,000, giving a range of 400,000–20,000,000.

V. All plating work should be done in duplicate when possible, but, if preferred, successive dilution "to the vanishing point" takes the place of duplication fairly well, *i.e.*, if in one case two plates from the same dilution run 190 and 180, and in another two plates run 190 and (with one-fifth dilution) 40, the check is equally good in both.

The Massachusetts Association of Boards of Health

JULY QUARTERLY MEETING

Boston, Mass.

The quarterly meeting of the Association was held at Gallup's Island, Boston Harbor, July 23, 1908, Dr. H. P. Walcott, President, in the chair.

THE PRESIDENT. The Association will come to order The reading of the minutes will be the first business.

On motion duly seconded, the reading of the minutes of the last meeting was dispensed with.

THE PRESIDENT. The next business will be the report of the Executive Committee. Your Executive Committee recommend that the following named gentlemen be elected to membership in the Association:

A. L. Beals, M.D., of Brockton.
Mr. F. O. North of Boston.
James Glass, M.D., of Framingham.
Mr. John Ritchie, Jr., of Boston.
Dr. Edwards W. Herman of Lincoln.
Dr. E. Channing Stowell of the Dublin Chemical and Pathological Laboratory, Dublin, N.H.
Dr. H. A. Chase, City Physician, Brockton.
Dr. James J. Minot of Boston.

On motion duly seconded, the above-named gentlemen were elected to membership in the Association.

THE PRESIDENT. The next business on the program this afternoon is the reading of a paper by Prof. Theobald Smith on "The House-Fly as a Carrier of Disease."

THE HOUSE-FLY AS AN AGENT IN THE DISSEMINATION OF INFECTIOUS DISEASES

By THEOBALD SMITH, M.D.

On being asked by our Vice-President, Dr. Durgin, to open a discussion on the house-fly as an agent in the dissemination of infectious diseases, I consented with some reluctance, because my first-hand knowledge of this subject is slight. I realize that the matter is one of considerable importance, however, one which cannot be too strongly brought to the attention of health officers, communities and individuals.

It is hardly necessary to cite authorities on the capacity of the house-fly to carry bacteria from one place to another. This capacity has been amply demonstrated and confirmed. The house-fly is known to be strongly attracted by noisome odors. It hovers about and feeds on human excreta. It eats blood, pus, sputum and other pathological products. In fact, its habits are well adapted to favor the soiling of the exterior of its body, and to fill its interior with various species of disease germs. Pathogenic bacteria have been demonstrated on its proboscis, its feet, in its digestive tract and its excreta, the well-known flyspecks.

The kinds of infections which it is best adapted to transport from place to place are typhoid, dysentery and Asiatic cholera. By seeding our foods, notably milk, with these germs which it obtains from dejections it may cause small localized family epidemics.

The bacilli of tuberculosis may also be disseminated by it, because the fly will feed on sputum, and the tubercle bacilli may pass alive through the digestive tract and appear in the flyspecks. Dr. Lord found living tubercle bacilli in the excreta of flies fed with sputum fifteen days after they had been passed. The severe epidemics of typhoid in our camps during the Spanish-American War were attributed by the investigating commission to flies. There can be no doubt that the house-fly is a potential danger in proportion to the number of individuals living in our environment.

I believe that this position will hardly be questioned by any one today, and it is not necessary to spend any more time on this aspect of the subject. The more important problem confronting us is how to restrict and suppress this noxious insect. In order that the house-fly may be controlled we must know where it breeds. The war upon mosquitoes was made, not upon the winged insect, but upon the larval stages in the water. In the same way the war upon flies cannot be successfully waged with fly-paper and flytraps, but it must be waged in the country of the enemy itself, against its breeding places.

In order that we may obtain a better view of the enemy's territory, it will be necessary to broaden our remarks so as to include certain other flies as well. For our immediate purposes flies may be divided into the biting and non-biting flies. Among the former are the flies that infest domestic animals, the horseflies and stable flies. Among these belong the dreaded *Glossina* species, which carry the trypanosomes of sleeping sickness and of several animal scourges.

The biting flies are to be found chiefly in the country, where they congregate near barns and stables. Among the non-biting or sucking flies belong the house-fly, the various flesh-flies and blowflies which lay their eggs on decomposing flesh.

Of these flies as carriers and inoculators of infection in our climate little is known and, therefore, little can be said. They should, however, not be wholly neglected as causes of disease. Veninger, in the *Wiener Med. Wochensder* of

1906, reports a case of inoculation—smallpox in an infant nine months old, who lived in a tenement across the street from the smallpox division of the children's hospital in Vienna. The physician found the child with high fever and a smallpox pustule on the inner angle of the left eye corresponding to six or seven days' development. The child developed generalized smallpox two days later and succumbed to it. Veninger reasonably infers that nothing but a biting fly could have been responsible for this case.

The development of these various species is practically the same and resembles in a general way that of the mosquito. If in the breeding of the mosquito we replace water with putrefactive and fermenting animal and vegetable matter we will have a fairly correct picture of the life cycle of flies. They lay their eggs upon horse dung, cow dung, decaying vegetables, fresh meat, cheese, dead animals and human excreta. The larvæ emerge from the egg and feed on the mass on which they were deposited. After a variable number of days they shut themselves into their skin which forms a hard case (puparium) around them and in it they are known as pupæ. There they undergo that marvelous transformation into the winged insect. Different species of flies prefer different decomposing material. The blowflies prefer meat, the flesh-flies dead animals, some, cow dung, others horse dung. The house-fly's chief breeding place is horse manure, but according to recent studies by Newstead in Liverpool, besides horse manure, spent hops, piggeries, old fermenting straw, paper, rags, and other refuse, mixed with human excreta, contained the larvæ of the house-fly. Decaying vegetables, old straw mattresses, rotten sacks in state of fermentation also gave them sustenance.

A single house-fly lays 120 to 140 eggs, each about one-sixteenth inch long. The larvæ (or maggots, as they are commonly called) leave the egg earliest eight hours after laying. They mature in five to eight days, and then pupate. The pupæ mature earliest in five to seven days. The adult fly requires, therefore, at least ten days (from the time of egg laying) to mature.

Our relation to the pest of flies is best exemplified by the answer to the question, what are flies for? This question we should always try to answer when we are endeavoring to destroy some species, for it frequently contains a solution of our difficulties, besides putting us on the right track towards further inquiries. Professor Comstock answers this question as follows:

"Although the habits of these creatures, which revel in all kinds of filth, are very disgusting, we cannot help admiring that arrangement by which a mass of filth, instead of being left to poison the atmosphere, is transformed into myriads of living beings whose swift flight and delicate forms lend life and beauty to the landscape."

This means that they are scavengers prepared to remove decomposing and putrefying matter by converting it into living things. The same is true of the bacteria. They are the scavengers of nature, absolutely indispensable. Only a small per cent of the many species have become parasites and disease germs. The house-fly unfortunately, by leaving the disgusting material upon which it normally feeds and entering human habitations and attacking our foods, has become a nuisance and a danger.

When we go into public restaurants in midsummer and are compelled to fight for our food with the myriads of house-flies which we find there, alert, persistent and invincible, we should ask ourselves, where did all these flies find a place to breed? What is the matter with this place, or the region immediately around it?

If we were allowed to investigate we should probably find one or more of three causes operating: neglected garbage, some stable with accumulating horse manure, or a dump near by. At the seashore other species of flies find the dead fishes thrown on shore good breeding grounds.

The difficulties with garbage are several. It is not always regularly collected. The receptacles are not cleaned out properly, so that the remnants of garbage permit the complete development of the fly in them. If garbage were collected thoroughly but once a week, the house-fly, which requires at least ten days to complete its development, would not mature in it. But the unsatisfactory receptacles used and the incomplete removal of their contents perpetuate the nuisance.

On dumping grounds I assume that many eggs, larvæ and pupæ of flies are deposited in the material brought there, and the development continues to the end. The public refuses to sort its refuse properly as directed by the city authorities, and as a result many things are thrown upon dumping grounds which should have been incinerated by the individual householders.

It is not necessary for me to go into details concerning these subjects, for we have with us members and officials of the Boston Board of Health who can tell us about every detail of garbage disposal, the restrictions placed upon horse stables, and the management of dumping grounds. In all the difficulties surrounding the public effort to keep a city clean the individual households are largely to blame. Neatness and cleanliness must begin at home, and no amount of effort and expenditure on the part of the city government can overcome family inertia. Moreover, the filth accumulating in a neighbor's back yard or cellar injures the entire neighborhood, for the flies soon migrate from their breeding grounds. For these they have no more use until they are ready to deposit a batch of eggs.

The campaign against the house-fly and other flies with similar habits is a campaign for general cleanliness and neatness, besides being a campaign against a troublesome pest.

Like most movements directed in the interest of the public health it broadens out from its original narrow intent. The war against human tuberculosis has become a movement for more normal, hygienic living in all details of our everyday existence. The fight against bovine tuberculosis has taught us to value above all a clean milk. The campaign against malaria has broadened into one against the mosquito, and will eventually extend to a general movement for the reclamation and utilization of the valuable lands now useless as swamps and marshes. In some other countries the preparation to successfully meet the plague has called attention to the enormous aggregate losses due to rats. It has already demonstrated the need of a better construction of sewers in many places and has re-emphasized the flimsiness of wood as a building material. Not that all these needful improvements and reforms were not recognized long ago by sanitarians. They now serve as great public lessons and demonstrations, and stimulate the people first to reflect and then to act. It needs two parties to all reforms, the one who discovers the need for it, and the people to respond. The first is powerless without the second.

There are many things we still need to know about the house-fly, but we need not wait for these to begin active hostilities.

THE PRESIDENT. Professor Smith's very instructive and useful paper is before you, gentlemen, for discussion. Dr. Chapin, I think we shall call upon you for some remarks upon this subject.

DR. CHAPIN. Mr. President, I had hoped that Dr. Smith would give us some definite information as to the part played by the fly in relation to typhoid fever, but I see that he did not commit himself on that subject. Even if we make a mistake in attributing more importance to the fly as a distributer of typhoid germs than the facts warrant, we shall make no mistake in inaugurating a war against this insect. It is desirable that we should have accurate knowledge, so far as it can be obtained, in regard to the part that the fly actually plays in the distribution of typhoid fever. A good deal has been written upon this subject. Some of it seems to me not to be warranted by the facts. Dr. Smith has well said that danger must increase as the number of flies increase. That certainly is so. It appears to me, also, that the danger must increase as the number of cases of typhoid fever increase.

It may very well be that in military camps, such as those of the Spanish War and Boer War, the great number of flies were effective in causing disease, because there were a great many cases of typhoid already there, and a great mass of typhoid excreta which the flies could carry; whereas, in a city like Providence or Boston, where there is little typhoid fever, even if the flies are very numerous, they might not have very much to do with the spread of the disease.

Some experiments concerning flies have recently been made in Manchester, Eng., where they have a good deal less typhoid than we do, even in our better cities. A study has been made there for several years of the seasonal distribution of flies, and it has been found that there is no connection between the distribution of typhoid fever and the distribution of flies. In Manchester, apparently, flies do not have very much influence on the spread of the disease — very likely because typhoid fever is not very prevalent. There are few privy vaults, and the flies do not have much of a chance to become infected, I suppose.

I was talking with Dr. Hill upon this subject when he was last here, and he said that in the mining camps in Minnesota the conditions were very similar to those which existed in military camps during the Spanish War. He found large numbers of flies running over fecal matter and over the food, and he believes that flies are there a very important factor in the spread of disease, but he thinks they are not so important a factor in our well-sewered cities.

MR. NYHEN. There is one matter, Mr. President, in connection with our public parks, to which some attention ought to be paid. In our public park systems I have observed, from time to time, that considerable excreta is found lying about, and frequently the health officers are obliged to follow up the officials in charge in order to have it got rid of. I think there are a great many of our citizens that do not pay much attention to this.

THE PRESIDENT. I venture to say in the world's history there have been no instances where man has interfered with the operations of nature more successfully than has been lately demonstrated on the Isthmus of Panama, and the Association fortunately has present here this afternoon a gentleman who has just returned from two or three years' service on the Isthmus of Panama. I will ask Dr. Coolidge to tell us something about the manner in which the Government has dealt with these things.

DR. COOLIDGE. I will say, Mr. Chairman, that I have seen more flies and more mosquitoes since my return to Massachusetts on the 8th of June last than I have seen on the Isthmus of Panama in all the three years of my service there. I don't know, Mr. Chairman, just what you would like me to talk about.

THE PRESIDENT. We would be glad to have you tell us anything in connection with your experiences there.

DR. COOLIDGE. They have made no special fight against flies in Panama. I have noticed, however, in the neighborhood of corrals, where horse manure is dumped and allowed to stand, that flies were breeding, and in some instances the Canal hotels in the neighborhood were crowded with flies, probably from that sort of breeding places.

Our most interesting work, from a medical standpoint, was the fight against yellow fever. That is mosquito work, and I do not know that that really has any place in this discussion on flies, but I know more about it because I have had more to do with it.

Fortunately for our attempts to eradicate yellow fever, the stegomyia mosquito is a "domestic" insect which prefers to breed in relatively clean water that is found principally in and about human dwellings. So in fighting the yellow-fever mosquito in its breeding places little had to be done in the way of outside work, such as we have to do in fighting the anopheles mosquito, which breeds in all sorts of places.

When you remember that up to the time when we installed municipal water supplies the entire water supply of all those people was from rain water, which had to be stored in receptacles of all sorts and sizes, you can easily understand how mosquito breeding places were multiplied. One of the hardest things we had to accomplish was to convince the people that their water barrel or their great iron tank, which they had made to hold water during the dry season, and which they had spent a great deal of money upon, was breeding death messengers to the many non-immunes who had come there. The obstructive attitude of the Panamanians in the early days was due to the fact that they thought we were interfering with their personal liberties, that we were "butting into" their households and depriving them of that with which nature had provided them in such abundance. With the installation of water supplies in the various cities the stegomyia work has become very simple. Although we were not able to offer them as good water as rain water, our officials, in a high-handed manner, as the Panamanians thought, ordered the water barrels out, and long since they are practically all dispensed with.

Our inspectors visited every house in every yellow-fever infected town periodically, and water was found — pitchers, glasses and barrels of water — kept in all sorts of places. These receptacles were emptied by our officials at regular intervals, unless proper covers were kept on them, by our orders. We have not had a case of yellow fever on the Isthmus since two years ago last May. The last case previous to that was in the December preceding. We did not know where that came from. It was found in the city of Colon, in an Italian peddler's house. We did not know where he got it.

We have a flourishing medical society on the Isthmus, in which we are all very much interested. At one of its recent meetings the measures which had been used in fighting yellow fever were discussed at length by Colonel Gorgas, who expressed the opinion that the most effective work in stamping out an epidemic of that disease was the campaign against the stegomyia mosquito in its breeding places. He considers the screening of patients and fumigation of houses of minor importance; that is, they tend to limit the number of mosquitoes that may be infected by patients, and kill infected mosquitoes that are in the houses of patients, but so many mild cases go unobserved that these latter measures do not materially shorten the duration of an epidemic unless accompanied by thorough work in destroying breeding places.

The work with reference to malaria is a more difficult problem. The malarial mosquito breeds outside, preferably in water in which algæ abound. In the rainy season on the Isthmus of Panama practically every hoof print becomes a breeding place. Consequently our Health Department during the dry season spends much time cutting underbrush and vegetation for a distance of about a thousand feet from inhabited dwellings and leveling the ground, so that the grass and other growths may be cut by horse power. Where it is impracticable to fill pools or streams these are thoroughly oiled.

THE PRESIDENT. There is one side of the question that might profitably be spoken of, and I do not know of any one that can talk about it any better than Dr. Stevens. I would like to know what he has to say about the fly in its relation to hospital conditions.

DR. STEVENS. My experience in connection with the Cambridge Hospital for many years has been that the house-fly gives us very little annoyance. The grounds are kept scrupulously clean; no barn manure is ever used on the lawns. The natural drainage from the hospital is such that all surface water drains away at once. The windows and doors are kept screened. By using extra precaution with all soiled dressings we have had very little trouble with the house-fly.

During the past few weeks we have had quite a number of our patients in tents, but the fly has not been a source of special annoyance. The beds of all typhoid patients have been kept screened, and more than usual care has been taken with all excreta. These precautions have been taken, having in mind the possibility of infection by the house-fly.

Patients in tents have suffered from mosquitoes, which the ordinary bed screen but poorly bars out.

Ten years ago I had an interesting experience with the house-fly at my farm in Maine. I had just built a new house, and everything about the place was perfectly clean; there was no filth of any kind near the house. There were no horses or other animals within a quarter of a mile, and yet we had millions of house-flies, more, in fact, than I have ever seen in any house. This nuisance has, however, been growing less each year, until at the present time we are not especially annoyed by flies.

I have never been able to understand why we were so annoyed. People in the country attribute it to the new paint, but this hardly seems probable.

I should be very much interested if Dr. Smith could tell us how to destroy the flies where they congregate. It would certainly save us very much discomfort, to say the least.

THE PRESIDENT. I will ask Dr. Durgin to say a few words on this subject.

DR. DURGIN. I have no doubt about the ability of the fly to transfer diseases, and he is, besides, a most infernal nuisance. I look upon this nuisance as a remedial one, and one against which we all ought to unite.

This paper is timely, and I did not begin thinking so today. It is not enough that one board of health should make and enforce regulations. I believe the way to do it is for us to make a united effort all over the State.

In Boston we have for many years tried to do those things which would make for greater cleanliness of premises, both inside and out. The drier the conditions the less you will see of flies; the less decaying matter you find about a place, whether it be horse manure or decaying vegetable or animal matter, the less flies you will observe.

With regard to our stables, we have for the last fifteen years been abolishing old manure pits. In many places we insist upon a cart being put under the chute which transfers the manure to the cart, and when that is full it is taken away. Sometimes it is taken away every day, and everything cleaned up. Barrels are allowed and are in use by those who prefer them. This helps greatly in avoiding a breeding place for flies in the stable.

With regard to privy vaults as breeding places for flies, we have almost absolutely annihilated them in our city.

There is a question as to whether the Board of Health should not make a regulation for screening rooms where there are typhoid and perhaps other patients. I am very certain that the best way to start the work against flies is to begin all together on a uniform regulation and a united understanding as to just what we will do and how the work is to be carried out. I desire to make a motion that the President appoint a committee of five members of the Association to consider this matter and report at the next meeting as to what regulations to adopt, together with any other action that the committee may deem advisable.

DR. TOBEY. I desire to second the motion.

THE PRESIDENT. Is there anything more to be said upon this motion? If not, I will put the motion.

The motion was adopted.

THE PRESIDENT. I will announce the committee later.

The next thing in order upon the program is a paper upon "The Disinfection of Books," by Mr. B. R. Rickards of Boston.

THE DISINFECTION OF BOOKS

By **BURT R. RICKARDS**
Director Bacteriological Laboratory, Boston Board of Health

One of the chief obstacles in the way of successful gaseous disinfection lies in the lack of penetration of such gases. Formaldehyde, in particular, is known to be a surface disinfectant with little or no penetrating power. Books with closely packed leaves are difficult to disinfect, but by the same token surface disinfecting is all that is necessary if the book has not been opened and handled by the patient. Thus in room disinfection there is no need of disturbing or opening books which have remained on the shelves during the course of the disease, since the exposed surfaces are the only surfaces needing disinfection.

Books which have been opened and handled by the patient present an entirely different problem. Here direct infection may have, and very likely has, occurred. In cases of pulmonary tuberculosis or in impending or convalescing cases of diphtheria, etc., saliva containing organisms of those diseases might readily be transferred to the leaves of a book by the act of sneezing or coughing, or still more certainly by the common though unhygienic habit of turning the leaves of a book with saliva-moistened fingers. Other easy means of conveying infectious material directly to the leaves by persons carrying infectious organisms of one kind or another will readily come to mind.

In Boston all public library books and schoolbooks found in the rooms of persons ill with certain of the infectious diseases are confiscated by the Board of Health. By order of the trustees of the public library all library books are burned, but schoolbooks, both those found in infected rooms and others submitted by the school committee, if in usable condition, are disinfected and returned.

When requested by the Board of Health to study the various methods of disinfecting books and to report a quick and at the same time efficient method which could be depended upon, our attention was naturally first given to formaldehyde gas. Tests were made as follows:

Public library books taken from houses where certain infectious diseases were present were obtained from the disinfecting station and definitely infected with the diphtheria bacillus on five or six different pages in different parts of each book. In some cases the pages were infected with the organisms by dipping a finger into a fairly thin water emulsion of the diphtheria bacillus made by rubbing the growth from a serum culture in the water of condensation and then placing the finger on the page to be infected, thus simulating as nearly as possible the act of the diphtheria patient in wetting his finger in his mouth and then turning the page. Other pages were infected by painting a portion of the page by means of a brush with a thick water emulsion of *Bacillus diphtheriæ*. In order to see how completely a page was disinfected if the leaves remained close together some pages were infected near the binding.

The disinfection experiments with formaldehyde were conducted in an unheated closet used for the purpose in the storage room of the disinfecting station on North Grove Street. In all cases the books were exposed to the gas for twenty-four hours, one-half hour to one hour being taken to throw off the gas.

FORMALDEHYDE DISINFECTION. Four different sets of experiments were tried with 40 per cent formaldehyde as follows:

No.	DATE	Formalin Used	Humidity, Relative	Temperature of Room	No. Books	Total Places Infected	Per cent of Good Growths	Per cent Absolute Negatives	Per cent Inhibited
1	Feb. 11	6 oz.	Beg. 46 End 55	37–39° F.	10	50	54	12	34
2	Feb. 17	31½ oz.	Beg. 87 End 84	43–54° F.	5	30	26.6 +	3.3 +	70
3	Feb. 26	30½ oz.	Beg. 68 End 84	44–46° F.	5	30	20	30	50
4	Apr. 27	31 oz.	Beg. 72 End 83	63° F.	5	30	16.6 +	26.6 +	56.6 +

In the first experiment the humidity was not increased other than by the water contained in the formalin. The room was very cold and the amount of formalin used low. Half the books were stood on wooden shelves, with the leaves spread, half were hung with the covers back to back from strings by means of clothespins.

In the second experiment the humidity of the closet was increased by sprinkling the floors and walls thoroughly with a watering pot. Three of the books were hung from strings and two stood on shelves.

Before the third set of experiments was run the wooden shelves and strings were removed from the closet and wire shelves of inch mesh substituted, with the idea of giving a freer circulation of the gas. The books in this and the subsequent experiment were stood on end and wooden wedge-shaped pegs, obtained for the purpose, inserted in the binding to spread the leaves. In this experiment water was boiled off into the closet to the extent of 21 ounces.

The fourth set of experiments was undertaken to see if the temperature factor was responsible in any way for the poor results obtained, the previous tests having been performed in the winter time.

From the table it will be seen that the efficiency of the disinfection increased with each set of experiments, both the humidity and temperature factors appearing to influence the result. Neither the position of the books nor the relative part of the book or page infected seemed to have any particular effect on the result, except that where pages were pasted together good growths were usually obtained.

We were thus forced to conclude that formaldehyde gas could not be depended upon to properly disinfect books, at least under the conditions with which we had to contend.

STEAM DISINFECTION. Although one authority states that "steam is not applicable to the disinfection of bound books on account of the glue and the leather," our attention was next given to this method, working along lines suggested by Dr. Slack.

After some preliminary experiments with infected books in our small laboratory autoclave, two sets of experiments were undertaken with the large steam sterilizer at the Southampton Street Hospital.

In the first experiment of this kind five books infected as before in six different places with *Bacillus diphtheriæ* were exposed to dry steam under a pressure of fifteen pounds for twenty minutes. A temperature of 250° F. was thus obtained No growths whatsoever were obtained after this experiment, the books apparently being absolutely sterile. The wooden wedges were used to keep the books open, the books standing on their edges. In this experiment the bindings were injured, owing to the wedges plus the heat applied. Some books were seared by the heat where they came in contact with metal.

A second set of experiments with steam was undertaken on June 8, fifteen to twenty pounds' pressure being used. Two books were held open by the wooden wedges, which in turn were suspended by strings. In this case the binding fell away from the books during sterilization, but being replaced while still warm and moist suffered no great injury. Two other books were suspended from strings by clamps.

In this case the clamps injured the bindings. In all of the above tests the books were found sterile.

Six books inoculated in six different places each (thirty-six tests) were laid flat on a wooden board. In only four cases were diphtheria bacilli recovered, and these were very few in number and were incapable of multiplication. It seems probable that in these four instances the organisms were in that part of the book next the board, and thus protected to some extent from the penetration of the heat.

CONCLUSIONS.

1. Formaldehyde is inefficient as a means of disinfecting books.

2. Steam sterilization of books is rapid and efficient. The books are not materially harmed by the process, except in the case of leather bindings, provided that care is taken to thoroughly warm the apparatus before the insertion of the books, thus preventing much condensation of moisture. Dry steam does practically no damage, except to leather binding. By this process books can lie flat, and thus avoid any tension on the bindings, provided that there is not too great a thickness of non-heat conducting material beneath them.

Books to be disinfected should be subjected to dry steam for at least thirty minutes at fifteen to twenty pounds' pressure.

In order to avoid chances of injury, so far as possible, the books should be suspended from strings placed through the center of the book like a bookmark, or they may be laid flat upon a wooden grating having wide openings and so constructed as to prevent warping. The sterilizer should be blown off and the books removed as soon as possible after the proper time has elapsed.

With leather bindings we can only suggest that the covers be removed where all leather, and that in half-leather bindings the leather be stripped off, the books being rebound after disinfection. This, while expensive, would be less so than to destroy the entire book or to resort to inefficient disinfection.

My thanks are due to my assistants, Drs. Slack and Arms, for their help and suggestions in carrying out the work.

THE PRESIDENT. The paper is before you for discussion, gentlemen.

PROF. SMITH. I would like to ask Mr. Rickards a question. Have you tried the effect of dry heat at a low temperature applied for a certain length of time in the sterilization of books?

The organisms which you would have to fear are not, generally speaking, spore bearing. The only question about it, I suppose, would be as to how far that treatment would injure the bindings.

MR. RICKARDS. We have not tried it, but it may be well worth while to look into it.

DR. DURGIN. I should fear very much that dry heat would not penetrate sufficiently. The book is practically a non-conductor with the pages closed up. If you carry the heat high enough to sterilize, you would injure the book. It requires a high temperature of dry heat to sterilize, very much higher than moist heat, and I should expect that all the leather would be destroyed with a dry heat at a temperature sufficient to do the work.

DR. CHASE. Nothing was said about disinfection after diphtheria. I am told by good bacteriologists that we can take a book or other article infected by diphtheria and lay it aside and the germs will die out. I should like to know how long a time it is necessary to lay a book aside, infected with diphtheria, before you can give it to a child to use.

MR. RICKARDS. My personal opinion on this matter is that where organisms are exposed to light and air the bacilli will die out quickly, where they are kept in the dark they will probably live for a considerable time.

A case was reported to me some time ago by a health officer in another State, where a set of phonograph records was handled by a child who was ill with diphtheria. The records were then taken away and put in a closet and were not opened for from six to nine months, as I remember it. The records were then used by a child of another family, who, so far as they were able to tell, was in no way exposed to the disease other than by these records. The child developed diphtheria. Of course you can never entirely rule out other sources of infection. The records during the time they were not used had been kept in the dark and entirely away from light and air.

I would like to add one further remark. During our experiments some of the books were taken from the steam sterilizer at Southampton Street and brought back to the laboratory, probably from half to three-quarters of an hour elapsing after they were taken from the sterilizer and carried through the streets before they reached me. The books were then too hot to be comfortably handled. The interior surfaces were hotter than the outside, showing that the heat penetrates.

THE PRESIDENT. Is there anything else to be said on this subject? If not, the Association is now ready for any miscellaneous business that may be brought before it.

MR. BOLLING. Mr. President, as you and the members of the Association are aware, there are a number of cities and towns in the Commonwealth that have been to the General Court and secured special legislation transferring the supervision of the milk supply, particularly the appointment and direction of the work of the milk inspectors, to the local Board of Health. I have yet to hear of a case in which this was done that has failed to result in increased efficiency. There are a number of other cities the Boards of Health of which feel that they could handle the milk inspection to greater advantage for the public good than is the case at present. There is also a feeling that this Association could help a great deal in the case of possible adverse committee reports in the securing of such legislation.

I would like to make a motion, Mr. President, that a committee be appointed to look into the matter of how many cities are desirous of making such a change, and by getting closely in touch with conditions pertinent to this matter in the next Legislature, ascertain whether it would be more feasible for such cities to apply singly or by means of a general act applicable to all, and in the latter case having the possible indorsement of this Association if it can be secured when the committee has reported.

DR. DURGIN. I second this motion.

THE PRESIDENT. Is there anything further to be said on the question? If not I will put the motion.

The motion was adopted.

THE PRESIDENT. How many members would you suggest for this Committee?

MR. BOLLING. I would suggest a committee of three.

THE PRESIDENT. If there is no objection the committee will consist of three, to be announced later.

With regard to the Committee upon the question of the fly nuisance which you have directed should consist of five members, having duly conferred with Dr. Durgin, who has his own ideas upon the subject of how it should be made up, so far at least as one member is concerned, I will name as the Committee the following gentlemen:

Dr. Charles V. Chapin of Providence.
Mr. John Ritchie, Jr., of Boston.
Dr. Charles E. Simpson of Lowell.
Dr. Lyman A. Jones of North Adams.
Mr. James C. Coffey of Worcester.

THE PRESIDENT. Is there any other business to come before the Association at this time?

DR. PALMER. I would like to make a brief report for the Committee on Sex Hygiene and say that the Committee is still alive and making progress. We have to present to the Association our first leaflet, which will be passed around at the close of the meeting, and which I hope the members will take and look over. I will say that we would be very grateful for any suggestions from any one as to how it may be added to or changed to make it more effective.

We are pleased to report that there is good interest in the subject and inquiries are coming from different sources and different places as to this work. We have a second leaflet in progress which will soon be out. I think I can assure the Association that the money used in this work will be well spent.

I would like to call attention to the paragraph on the last page of this leaflet, which says:

> "Copies of this leaflet will be mailed without charge upon the request of any responsible person, for judicious distribution. Unions, schools and colleges, churches, associations of men and boys, physicians, employees, and other citizens are invited to help in this work of publicity.
>
> Address Committee on Sex Hygiene, 4 Joy Street, Boston, Mass."

Mr. Walter E. Kruesi, Secretary of the Boston Association for the Relief and Control of Tuberculosis, has charge of this part of the work, and will be glad to give copies of these to any one that wants them. It is not our purpose to throw them about indiscriminately, but to distribute them carefully and economically and put them where they will do the most good.

SEX HYGIENE FOR YOUNG MEN

Circular No. 1

On account of the ignorance and false modesty of parents, the average boy does not receive at home the information that he should about sex hygiene. As a result, his first knowledge comes to him in distorted form from ignorant and morbid associates, or through some secret experience that often costs him dear in health and money, and hurts the clean record he will one day want. In the hope that some who read this leaflet may escape such needless sacrifice, some facts well known to physicians are here presented.

If his parents have been timid or careless about instructing the boy in the facts of his sex life, and if he feels unequal to inquiring of them, let him ask the family doctor to tell him all about it. He should not be satisfied with what the other boys have picked up, heaven knows where, and should especially avoid the advertising "specialist" in "men's diseases." These charlatans trade on the facts that many boys have practised self-abuse, that nearly all young men have emissions in sleep, and that few consult their parents or physicians on these matters. They use "insanity," "nervous debility," "lost manhood," "varicocele" and "unnatural discharges" to fill with secret terror thousands of boys, who are thus led to see in these emissions and other natural physiological manifestations the undermining of their manhood.

No one should be alarmed at the seminal emissions that occur during sleep; they do not indicate an unhealthy condition unless they take place oftener than once in ten to fourteen days. More frequent emissions may be due to some slight local irritation which one's doctor can easily detect; or to excitement in thought or deed, lack of physical exercise, overeating, or alcoholic drinks, all of which are injurious to the body in general and to the sexual organs in particular. Few men who take plenty of outdoor exercise, eat moderately, and keep their thought of sex matters open and clean, will need medical treatment for seminal emissions. On the other hand, infrequency or absence of these emissions is not necessarily harmful. The important point is not to harbor alone an alarm, due to ignorance, or allow a "specialist" to profit by fear and shame rising from it.

The first function of the reproductive organs is to develop the boy into a man. A boy deprived of these organs in childhood never becomes a perfect man in either body or mind; and a boy who abuses them risks the loss of the manly perfection he might otherwise attain. Many young men have the mistaken idea that the genital organs, like the muscles, are developed through voluntary exercise and become weak through disuse. If that were true the boy who exercises them regularly from his tenth year onward should have the greatest sexual power, but every one knows that this is the reverse of the truth. The testicles are glands that, like the tear glands or the sweat glands, produce a fluid peculiarly their own. The sexual power is never lost through abstinence from cohabitation, any more than is the ability to weep lost through not weeping. Sterility, impotence or loss of manhood are the direct result of masturbation, sexual excesses, or of venereal disease (gonorrhœa or syphilis).

Ignorance of their sexual functions, the mistaken idea that self-indulgence is a proof of manliness, and fear of the ridicule of thoughtless companions, have led countless boys into pernicious habits and actions that bring lifelong wretchedness and regret. The increasing interest in athletics is leading greater and greater numbers of men to know, at first hand, the connection between strength and courage on the one side, and abstinence from alcohol and sexual indulgence on the other. Men in training for athletic contests are prohibited from these indulgences.

The sex principle is universal in nature. It is the force behind the constructive and progressive processes of all life, from the color-adaptations of birds and flowers to the highest leadership in men. Reproduction is only one of its many functions; and the man who assumes that the so-called physical desire that at times thrills him indicates a need of sexual intercourse is in danger of depleting and wasting from his life a chief source of physical and mental growth.

THE VENEREAL DISEASES

1. Every prostitute, public or private, acquires venereal disease sooner or later, hence all of them are diseased some of the time, and some of them practically all of the time. The man who patronizes them risks his health at every exposure.

2. Medical inspection is more of an advantage to the prostitute than to her patrons, to whom it gives a false sense of security. Even the most painstaking examination — and such is not bestowed upon the prostitute — may fail to detect such a woman's lurking disease.

3. The many antiseptic washes, lotions and injections upon which some men rely for protection from disease are ineffective.

4. Gonorrhœa, or "clap," while usually cured without apparent loss of health, has always serious possibilities; it often produces urethral stricture, which later may cause loss of health, and even of life; in many cases it causes chronic pain and distress in the sexual organs, with severe mental depression; it impairs the sexual power and fertility of many; it permanently cripples one in a hundred; it kills directly one in two hundred cases. The loss of health, time and money

entailed by these sequels and their treatment may far exceed that occasioned by the original disease.

The teaching that gonorrhœa is a mere annoyance, "no worse than a cold," is based upon ignorance, recklessness or wanton cruelty. Its persistence in the deeper parts long after it is outwardly cured, leads men unsuspectingly to give the disease to women with whom they cohabit. Among these may be their brides, who thereupon enter upon a period of ill-health that may ultimately compel the mutilation of their sex organs by a surgical operation. Much of the surgery of these organs performed upon women is rendered necessary by gonorrhœa contracted from the husband. Should a woman give birth to a child while infected with this disease the baby's eyes may be attacked by the infection, often with resulting loss of sight. Probably one-fourth of the blindness of children is thus caused.

5. The other serious venereal disease, syphilis, infects the blood, and therewith all parts of the body. For months after infection with this disease the individual may communicate it by a kiss as well as by cohabitation; and articles moistened by his secretions, such as towels, drinking glasses and pipes, may also convey infection. While under proper treatment the disease is not dangerous to life in the earlier years, yet the probabilities of transmitting the contagion should forbid intercourse for at least three years after infection.

The most serious results of syphilis appear years after its acquisition, when the individual has been lulled into a false sense of security by long freedom from its manifestations and considers himself cured. It may attack any organ of the body, even the brain. Among the diseases frequently thus produced are youthful apoplexy, general paralysis or paresis, and locomotor ataxia. These often appear after the man has acquired a family that is dependent upon him for support.

The disaster to the individual wrought by syphilis is shown by the attitude of the leading insurance companies toward those so affected, a purely business attitude, devoid of all sentimental consideration. They refuse to insure the life of a syphilitic person for four or five years after the disease has been contracted, and then only upon special terms. Their records prove that syphilis shortens life.

That the syphilitic parent may transmit the disease to his offspring is common knowledge; some of his children are destroyed by the inherited disease before birth; others are born to a brief and sickly span of life; others attain maturity, seriously handicapped by a burden of ill health, incapacity and misery induced by the inherited taint.

6. The man who contracts either gonorrhœa or syphilis should realize that the best use he can make of his time and money is in having the disease promptly and thoroughly cured. He should consult an honest, competent physician immediately, not an advertising fakir. He should not waste time in buying some drug-store remedy, or some medicine recommended by a friend; he would not have his broken leg treated that way, yet this disease is far more serious than a broken bone, since it may destroy health, and even life. The sooner he secures skillful treatment, the better is his chance of escaping these disasters. If he has no money, he can secure free treatment in large cities at a dispensary. Moreover, he should understand that an apparent cure is not always a real cure; the germs of gonorrhœa or syphilis may lurk in the deeper parts long after the outward symptoms have disappeared. Only a competent physician can give intelligent and reliable assurance that the disease is really eradicated. Until such assurance is secured, the patient has no right to consider himself well or safe.

SEX HYGIENE FOR YOUNG MEN

Circular No. 2

Information for Persons Having Venereal Disease

We hand you this leaflet, believing that you would not willingly communicate your disease to some innocent person. This you may do by failing to realize the possible disastrous results. Among these results are many cases of blindness, complete disability and not infrequently death.

Syphilis (or pox) is especially a disease which innocent persons may contract from one who has it. It is not merely a local disease, but is in the blood. It usually produces sores in the mouth or on the lips, so may be conveyed by kissing, drinking from the same cup or using anything which has been put to the lips or into the mouth of one who has the disease.

Both syphilis and gonorrhœa are often communicated even after the patient thinks he has fully recovered. Hence marriage contracted before complete recovery from the disease results in much unhappiness, and often in the death of the wife. About 25 per cent of the blindness of children and the great majority of abdominal operations on women are due to infection from gonorrhœa — generally innocently contracted from their husbands. Syphilis poisons the blood so that your baby born years later may be dead, deformed or imbecile.

Long experience has proved that strict observance of the following rules will hasten your recovery, prevent the spread of the disease and insure you against insanity, paralysis or other illness in future years:

Consult your doctor at least once a week for the first three months, and (if syphilitic) at least once a month for two years. Do not consider yourself cured because the syphilitic rash has disappeared.

Avoid patent medicines, so-called "Medical Institutes" and advertising quacks.

Do not have intercourse and avoid all sexual excitement until your physician says you are completely cured.

Sleep alone. Have the windows open the year around.

Carefully wash your hands with soap and hot water whenever you handle the private parts. Always use a separate towel.

Burn all cloths or cotton soiled by discharges.

To avoid possible blindness from gonorrhœa, be especially careful not to rub your eyes with your fingers.

Under no circumstances allow any one else to use your towels, brushes, combs, razors, shaving-brushes or other toilet articles, and do not use such articles belonging to any one else.

Do not allow any one else to use any article that has been in your mouth, such as toothbrush, toothpick, pipe, cigar, pencil, fork, spoon or drinking-cup.

Do not kiss any one.

Do not wipe the face of a child with a handkerchief you have used.

Brush your teeth night and morning (or better, after each meal) and keep your mouth clean.

If you have bad teeth, have them attended to by a dentist, and be fair to him and his next patient by telling him that you have syphilis.

Do not marry without the full consent of your physician.

THE PRESIDENT. The Chair desires to announce that the Committee upon the milk question will consist of the following named gentlemen:

Mr. George E. Bolling of Brockton.
Dr. G. L. Tobey of Clinton.
Dr. Elliott Washburn of Taunton.

Is there any further business to come before the meeting? If not a motion to adjourn is in order.

On motion, the meeting adjourned.

CHEMICAL LABORATORY NOTES

By PROF. FRANKLIN C. ROBINSON
Bowdoin College, Brunswick, Me.

TEST FOR BOILED MILK.* Boiled milk decolorizes a solution of hematin in a few seconds, while the color persists in raw milk for twenty-four hours or longer. To apply the test add 20 drops of a one per cent solution hematin to 20 c.c. of the milk in a test tube, and shake the mixture. If the milk has been heated only to 70° C. it will take ten minutes to decolorize. Milk sterilized in closed vessels will not react to the test.

ROUGH TEST FOR BACTERIA IN MILK.† To 10 c.c. of the milk in a test tube add .5 c.c. of a solution of the dye methylene blue (made by diluting 5 c.c. of a saturated solution in alcohol to 200 c.c. with water). If the color is discharged in a few minutes, the milk contains 100,000,000 bacteria or more per c.c. Clean milk has but little decolorizing action.

ACTION OF COLLOID SILVER ON BACTERIA.‡ The preparation of colloid forms of the metals is one of the most interesting of the recent chemical discoveries. A method of preparing several of these in very pure condition is to pass an electric arc current through water between electrodes of the given metals. Colloid particles come off from the electrodes and dissolve or remain suspended in the water.

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* Ann. de chim. anal., Sppl., 1908, 13.

† Zeit. Untersuch, Nahr. Genussm., 1908, 15

‡ Compt. rend. hebd. de la Soc. de Biol., No. 26, T. 60.

Colloid silver thus prepared destroys many kinds of bacteria. Thus anthrax, typhoid, staphylococci are killed if only one part of silver in 50,000 of water is present. It is found that the colon bacillus is less sensitive to this reagent than the typhoid, and this may serve as a means of differentiating between them.

A NEW DISINFECTANT. "Ennan" is the name of a new disinfectant brought out in Germany. It consists of a combination of meta- and para-cresol with a hard soap. It is sold in the form of one-gram tablets, which are easily soluble in warm water, and do not have the disagreeable smell of earlier preparations, as lysol, etc. The solid form is more convenient also for use in sterilizing instruments, because solutions of definite strength can very easily be made, as each tablet contains .5 gram of cresol. Tests of it have resulted very favorably.

EFFECTS OF SMALL QUANTITIES OF ALCOHOL ON ANIMAL LIFE.* Laitinen, a German physiologist, has recently published the results of his experiments on administering to rabbits small daily doses of alcohol. The amount given was from .3 to .1 c.c. to one kilogram of animal weight, which corresponds to one glass of beer per day for a man of average size.

He found that the resistance of the red blood corpuscles to destruction by other animal sera was lowered; that the bactericidal power of the blood was lessened; that the animals were more susceptible to contagious diseases, and that their offspring were less vigorous.

SOLUBLE SOAPS AND HÆMOLYSIS.† Noguchi has recently established the interesting fact that solutions of all soluble soaps have the power of dissolving blood corpuscles, but lose that power when mixed with normal blood serum. In the latter condition such solutions act like true complements; that is, dissolve blood corpuscles which have been treated with immune sera, but not normal blood corpuscles. In other respects also they act like complements, for example, lose their activity at 56° C., and at 0° C., and by long standing, and by action of sunlight in presence of eosine, etc.

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* Zeitschr. für Hygiene, u. infektions, Kr. Bd. 58.

† Biochem Zeits., Bd. VI.

IMMUNITY FROM SNAKE POISON BY POTASSIUM PERMANGANATE AND CHLORIDE OF LIME.* Because the above substances act favorably in case of snake bites, the claim has been made that, by previous use of them hypodermically, a person can be rendered immune against such accidents. But Brieger and Krause have been unable to verify that claim, and state most positively that such immunity can only be obtained by the use of protective sera.

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* Archiv. f. Schiffs, u. Trop-Hyg., 1907, Heft 6.

PERSONAL HYGIENE

By PERCY G. STILES, Ph. D.
Instructor in Physiology, Massachusetts Institute of Technology

CONCERNING MEAT. Next to the alcohol question there is apparently no subject connected with personal hygiene which has been so much discussed and with so much partisan spirit as the dietetic rank of meat. At the present time the familiar note is one of protest against its extensive use. This teaching has been powerfully reënforced by tales of evil conditions in the packing establishments and, in quite another way, by the high cost of good meat. It is timely to ask what the physiologists can say regarding a matter upon which the layman hears so many sermons from doubtful authorities.

First of all it may be said that the average man exaggerates the difference between meat and other foods. This is natural, for all traditions emphasize the distinction. Why is abstention from meat considered fasting? Is it assumed that meat has an untoward influence so that one is better without it, or is it recognized to have a unique excellence so that the omission involves real self-denial? Erasmus Darwin whimsically excused himself from the Lenten regimen by citing the Scripture, "All flesh is grass," and his science was better than he knew. Still we may find certain peculiarities in meat which call for comment.

Half-trained teachers and writers often confuse the meat question with the protein question. The two must be clearly distinguished. It is possible to have a diet low in protein but including meat, and equally possible to have a vegetarian diet with an excess of protein. One may admit that a lower protein ration than the time-honored 100 grams is to be desired, but it does not necessarily follow that meat is not a good source for some of the protein which is retained.

We are but just now beginning to recognize that proteins of various origin in nature have marked individuality. This fact appears when we study their decomposition products. The same amido-acids are found again and again, but in percentages specific for each protein. Abderhalden treats this matter in its bearings on nutrition in his recent "Text-Book of Physiological Chemistry." Suppose that an animal is required to use a characteristic vegetable protein to make serum proteins for itself. It separates the groupings of the foreign molecules by tryptic digestion, it absorbs the simple products, and assembles them again in new complexes conformed to its own unvarying standard. In this process there is an inevitable waste, just as there is when one building is torn down and the material used to construct another. Certain units of structure are in excess while others are deficient. The animal has but a limited use for glutaminic acid, an abundant decomposition product of most vegetable proteins. It needs much leucin which the plant proteins usually furnish sparingly. It seems a fair inference that flesh proteins can be worked up more economically for endogenous metabolism than can plant proteins, because the former resemble the type to be produced much more closely. To return to our comparison, there will be some lumber to discard when we have built our new house from the ruins of the old one, but probably not so much as if we had built it from the timbers of a ship. The molecular architecture of animal and of vegetable tissues differs somewhat as does marine construction and that of buildings on land.

From what has been said it would seem that meat is the ideal source of protein for tissue building. The presence in it of nucleins and of hemoglobin makes its fitness the more apparent. Whatever is to be said against meat must be aimed at its non-protein constituents and chiefly at the nitrogenous extractives. And the charges brought against this class of bodies are at present very vague. Some of them are uric acid formers without doubt. They have been tellingly described as waste products of animal life, with the implication that we should abhor them as such. Certainly they do add to the total of our own excretory products, and hence they are assumed to tax the liver and the kidneys. It is possible that they are in the main responsible for the limited endurance which Fisher showed to be characteristic of those who eat meat freely. The notion that they affect the disposition unfavorably is prevalent but fanciful.

On the other hand, we must not forget that these extractives are the best promoters of gastric secretion known to us. It is true that the gastric juice flows whenever a meal is distinctly enjoyed, without regard to its chemical composition. A good appetite is a fair guarantee of good digestion. But when appetite flags the value·of meat and its extractives, in moderation, is surely great.

We believe, on the whole, that the agitation against meat is carried much further than the facts warrant. Its proteins are distinguished from those of vegetable origin only by a closer resemblance to the typical ones of the human body, and its extractives have a good influence upon digestion, which probably offsets any injury they are likely to do to the average individual. The appeal of meat to the appetite is commonly stronger than that of any other food, and it is sound hygienic teaching that counsels the choice of that food which is best relished, provided that extreme and eccentric diets do not result. Of course it is well to add, that the attractiveness of meat readily leads to over-consumption (frequently in men, rarely in women). This means excess of protein, with the probability of anaërobic decomposition in the colon and many ill effects. We do not wish to neutralize any warnings against such excess, but, as we have said above, that is the protein question and does not influence our judgment of the virtue of animal food *per se*.

VETERINARY HYGIENE

By LANGDON FROTHINGHAM, M.D.V.
Harvard Medical School, Boston, Mass.

HUMAN AND BOVINE TUBERCLE BACILLI.* Kossel reviews at some length the Second Interim Report of the Royal Commission appointed to inquire into the relations of human and animal tuberculosis. The conclusions which he draws are of much interest and are as follows:

That the researches of the Commission do not prove the identity of mammalian tubercle bacilli; on the contrary, the experiments which are free from objection point towards the correctness of the two-type theory (human and bovine) in the sense of the followers of Koch.

That the possibility of the alteration of one type to the other remains as before a hypothesis, and that the results of the English investigation show new proof that by far the greatest source of infection for man is man.

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* Kossel's Summary of the Report of the Royal Commission, Deutsche Medizinische Wochenschrift of January 30, 1908.

MUNICIPAL SANITATION

By **CHARLES V. CHAPIN, M.D.**
Superintendent of Health, Providence, R.I.

SANITARY PATROL OF WATERSHEDS. When a municipal water supply is obtained from surface waters a great deal can often be accomplished in the way of preventing pollution by a frequent inspection of the drainage area. A suggestive article on this subject appeared in the May number of the Bulletin of State Department of Health of New York. One way of making such inspection efficient is to offer a reward for the report of cases of typhoid fever on the watershed. According to Whipple,* the city of Waterbury offers a reward of ten dollars for every report of a case, and Springfield offers a reward of two dollars. Inspectors then see that disinfection is carried out, and disinfectants are furnished by the city.

TYPHOID CARRIERS. Evidence is constantly accumulating of the importance of well carriers of typhoid bacilli in the causation of the disease. Davies and Hall † report an instance where a woman carrier gave rise to two outbreaks. She had had typhoid fever in January, 1901, and in 1904 and in 1906 typhoid fever occurred in the institution in which she at the time worked. The infection was, without doubt, traced to her in the last outbreak. The most interesting point about this carrier was that although bacilli were found in large numbers in her fæces, on December 20, 1906, and April 14, 1907, examinations made on November 18 and 29, 1906, and January 20, February 14, February 18 and March 14, 1907, were negative. The management of typhoid carriers when found is a serious enough problem. But if the bacilli can be isolated from the discharges only at irregular intervals, the difficulty of controlling this source of infection is great indeed. Scheller * tells the story of a carrier who caused thirty-two cases in fourteen years. He also gives an account of forty persons who drank infected milk. Of these eighteen proved to harbor the bacilli, of whom five had had typhoid fever, while thirteen others carried the germs of the disease without having been sick. Scheller did not find the bacilli constantly present in these cases, for of 54 examinations of the fæces of these 18 persons only 25 gave positive results, while of 54 examinations of the urine only 23 were positive.

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* Typhoid Fever, by George C. Whipple, 1908.

† Proceedings of the Royal Society of Medicine, April, 1908.

TYPHOID FEVER ON DAIRY FARMS. When typhoid fever is traced to a milk supply, and a case of the disease is found in the dairy or on the farm, the health officer in control usually stops the supply. The question then arises, when can he safely permit the farmer or the dealer, in whose family the disease exists, to again engage in the milk business? Some say that the only way to do is to hold up the business until it has been determined that the patient is no longer excreting bacilli in the fæces or urine. There are two difficulties in the way of doing this. In the first place, there is difficulty in finding who is infected and how long the infection continues. It is manifestly absurd to devote attention to the patient exclusively. There are quite likely to be carriers or walking cases in the family or household, and these also must be sought out. It is by no means easy to obtain and examine in a fresh state fæces from every member of the household. Again if, as suggested by the cases reported in the preceding paragraph, the bacilli are frequently absent

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* Centralblatt. f. Bakt., Parasit. u. Infect., 1908, Abt. I, Orig. s. 385.

from the fæces of even pronounced carriers, even two or three negative examinations are not to be relied on. Secondly, suppose that on an ordinary New England milk farm it should be found that the farmer, his wife or his daughter is a chronic carrier. What then becomes of the rule, that milk shall not be sold until typhoid bacilli disappear from the farm? They are not likely to disappear for years. That means that if the rule is enforced the farmer must give up the business of milk production. Are boards of health ready to enforce such a rule?

It has been suggested that a time limit be adopted for such cases, and that the milk be not sold for two or three months after the convalescence of the patient is established.

Another suggestion is that in the case of a typhoid-fever carrier upon a farm the milk business should not be arbitrarily stopped, but that the responsibility for any infection of the milk should be placed upon the producer. He should be shown the danger of infection, and the way to avoid it, and should be held liable if infection occurs. It is doubtful whether the public would take kindly to this shifting of the responsibility from the health officer to the producer of the milk.

Now that we are learning the important part played by carriers in the production of typhoid fever, it is important that the question of their control should be thoroughly discussed. It is very undesirable that ill-considered rules should be adopted which may later be found to be difficult to enforce and perhaps unnecessary.

SCARLET FEVER AND DESQUAMATION. A recent article * calls attention to the evidence that desquamation in scarlet fever is not infectious. Some of this evidence has been presented to the readers of the AMERICAN JOURNAL OF PUBLIC HYGIENE before, but the writer of this article refers to the experience of Birmingham, where desquamating

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* Public Health, June, 1908, p. 148.

patients actually gave rise to fewer cases of the disease than did those that were entirely through desquamating. In Huddersfield, during 1905 and 1906, scarlet-fever cases were discharged from the hospital without reference to desquamation, and there were no more return cases than in previous years. The average duration of stay in the hospital was by the new method reduced from 44.3 to 29 days.

CIRCULAR CONCERNING TYPHOID FEVER. In the November number of the *Northwestern Lancet* for 1907, Hill had an interesting article on contact infection in typhoid fever. It contained a proposed circular of information concerning modes of infection in this disease. It seemed such an excellent circular, that with a few slight changes, it has been adopted by the Health Department at Providence, and a copy of it has been sent to every dealer and producer of milk supplying that city. The circular occupies nearly four pages, letter size.

AN EFFECTIVE MEANS OF REDUCING THE DEATH RATE. The last report of the Department of Health of the city of Minneapolis has the following paragraph:

"The total number of deaths for the year was 2,959, 135 more than were recorded during 1906. Deducting deaths of babies under one week of age, violent deaths and deaths of non-residents who were brought into our hospitals for treatment, computed on an estimated population of 300,000, the death rate per thousand is 8.56. This makes Minneapolis the healthiest city in the United States."

It is to be noted that the estimated population is 11,852 more than the estimate made, according to the rule prescribed by the Federal Census Bureau. Nowhere in the report is the true death rate given. It seems incredible that at the present time the health officer of a city the size of Minneapolis should be guilty of such a misuse of figures.

SANITARY ENGINEERING NOTES

By **ROBERT SPURR WESTON**
Assoc. M. Am. Soc. C.E.

THE EFFECT OF LOW TEMPERATURE ON BACTERIA IN ICE.* A popular article describing results of tests made to determine the elimination from ice of bacterial life of pathogenic origin, accompanied by tables giving the results of experiments made to determine the viability of *B. coli*, *B. typhosus*, streptococcus and anaërobic spore-forming bacilli in ice. The results confirm the previous work of Sedgwick, Park, Jackson and others. The author found that at 1.6° C., *B. coli* disappeared from ice within twelve, *B. typhosus* within nine, sewage streptococci within twenty, and anaërobic spore-forming bacilli within twenty weeks. The diminution in numbers of bacteria during the first few days of storage is noteworthy. Over 94 per cent of the *B. typhosus* present died within one week.

THE PROTECTION OF LAKE MICHIGAN FROM CONTAMINATION.† At the invitation of Mayor Busse more than one hundred representatives from more than forty municipalities located on Lake Michigan gathered in Chicago on April 11. A permanent organization was formed which will, doubtless, support the Commission already appointed to investigate every phase of the sanitary conditions existing near the shores of the lake, especially those affecting the water supplies of the municipalities. This Commission consists of thirteen members, including one from the Corps of

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* John C. Sparks, Ice and Refrigeration, April, 1908.

† Eng. Rec., 57, 514.

Engineers, U.S.A., one from the United States Public Health and Marine-Hospital Service, and representatives from the three States and the various cities concerned. Among other things the Commission will determine the existing degree of pollution and the additional pollution which may be permitted without endangering the various water supplies. It is to be hoped that the movement will result in legislation which will prevent the supply of polluted water to any of the lake municipalities.

THE SANITARY CAMPAIGN IN CALIFORNIA.* A campaign against the bubonic plague is to be undertaken this summer in California, east of the Sierra Nevada Mountains, under combined Government and State auspices. P. A. Surgeon Rupert Blue, of the United States Public Health and Marine-Hospital Service, has charge of the work. Much of the work is educational, and upon the success of this part is largely dependent the success of the whole work. Of the four types of the plague the bubonic type, which affects the various glands of the body, is most important. The disease is carried by bacteria, and the bubonic type requires some intermediary for its transmission. The common rat is exceedingly susceptible to the disease and is the chief source of danger. The disease is communicated to man by the bites of fleas, particularly *Pulex cheopis*, which is found on rats. Rats congregate and migrate in large numbers and tend to spread the disease. Before drinking human blood, the flea injects a fluid often containing plague bacteria into the incision which it has made in the skin. Furthermore, when the flea bites it also discharges on the skin from its alimentary tract a fluid filled with bacteria. The danger is greatest in warm weather, because at that time the rats carry the most fleas (thirty per rat on the average). In winter most of the fleas leave the rats. Accordingly the killing of rats is being prosecuted vigorously. The disease was first confined to the Asiatic quarters of San Francisco, but has since spread to the white quarters and to other parts of California. The climate of California and the conditions in San Francisco are favorable to the propagation and growth of rats. The garbage disposal has not been carefully regulated, and the garbage dumps, public and private, also open garbage cans have furnished abundant food for rats. Furthermore, many sewers, stables, granaries and houses have harbored the rodents. Large numbers of rats have been killed. Building ordinances requiring rat-stops in buildings will be passed. More stringent regulations regarding garbage disposal have been adopted, and it is hoped that the plague will be stamped out. This is assured if the emergency measures be followed by permanent sanitary improvements.

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* Eng. Rec., 57, 499.

THE WORK OF THE SANITARY AND DRAINAGE COMMISSION OF CHARLESTON COUNTY, S.C.* An account of the drainage and the opening for settlement of valuable land near Charleston, S.C., previously uninhabitable by whites, because of the prevalent malaria. On 400,000 acres of land were less than 2,500 white people. Eighty-five miles of canals and ditches have been dug and 15,000 acres of land reclaimed.

CHEMICAL AND BACTERIAL EXAMINATION OF THE LONDON WATER SUPPLY.† Dr. Houston's report for the year ending March 31, 1907, has appeared. Eleven thousand nine hundred and ninety-three samples at 150 different places were examined. Dr. Houston discusses the effect of storage and compares passive storage, or holding of the water for emergencies, with active storage, or "habitually circulating raw river water through the storage reservoirs." Undoubtedly the latter is the preferable plant, but certain economic considerations, especially those affecting pumping, interfere. The practice is a combination of the two methods, keeping in view the fact that the Thames receives a more or less carefully treated sewage from over 1,000,000 people. The average efficiency of the filter plants was 99 per cent. The gross average of bacteria in the effluent was 20 per c.c. or only 11 per c.c. if samples showing more than 100 per c.c. be excluded. Dr. Houston states that for a water of satisfactory quality, less than 50 per cent of the 1 c.c. samples of raw water should contain typical *B. coli*, while for filtered water more than 50 per cent of the 100 c.c. samples should contain none. Seventy-five and four-tenths per cent of the London filtered water samples reach this high standard. Filtration removes considerably more typical than atypical *B. coli*. The typhoid death rate for London is very low, — 6 per 100,000.

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* Anonymous, Eng. News, 59, 398.

† Anonymous, Eng. News, 59, 417.

UNDERGROUND WATER SUPPLIES.* The augmented number of deep wells in County Kent, England, has already caused such a draft upon the ground water, that a shortage of this source in the future may be expected. Already the Metropolitan Water Board has stopped increasing its takings. Private wells for industrial purposes have increased greatly, and the question will soon arise, namely, whether the manufacturers or the municipalities have first right to this source of supply. Much of the water is used for paper making. Over 10,000 gallons of water are required to make a ton of paper. The sanitary excellence of the supply is a reason why the industrial uses should give way to the municipal. But old-established firms look upon the water as their private property. Over 2,000,000 gallons of salt water, per day, seep into the Kent wells from the Thames estuary, and it is possible that the wells will be made useless in this way. Those nearest the Thames will suffer first, while inner wells will escape indefinitely.

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* Editorial, Eng., 85, 654.

REMOVAL OF SUSPENDED MATTERS FROM WATER AND SEWAGE AND REMOVAL OF BACTERIA FROM AIR FOR ENUMERATION.* A letter and sketch which explain clearly how bacteria, and other suspended matters, are retained by sand filters by "adhesion," although the passages through the sand layer may be many times the size of the bacteria or suspended matter. The sand method for the determination of bacteria in air is satisfactory when sand with a diameter of not over 0.3 mm. is used to collect the bacteria from the air filtered through it. The size of the sand affects the removal of bacteria in two ways: (1) in a given depth the number of surface contacts which permit adhesion vary inversely with the size of the particles; (2) a greater velocity of flow is possible with the larger particles. Hence a greater tendency to tear away the particles already adhering to the sand grains.

PROGRESS IN THE CHEMISTRY OF WATERS.† This is an extremely valuable bibliography of the recent literature in the field of water supply, water purification and distribution, water analysis and the use of water for steam making. There are two hundred and seventy-three references to the literature of the last two years, and each reference is accompanied by terse description.

It would repay any water chemist to read these articles.

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* C.-E. A. Winslow, Eng. News, 59, 629.

† A. Goldberg, Chem. Ztg., 32, 173; also 187, also 203.

VITAL STATISTICS

By MARSHALL LANGTON PRICE, M.D.
Secretary State Board of Health, Baltimore, Md.

"And the Law is Common Sense." — JUDGE GRAY.

THE ETHICS OF REGISTRATION. Registration may be defined as "the written return under statutory requirement, by certain designated persons, to lawfully constituted officers, of facts concerning individuals whose relations to the State are of temporary or permanent special interest or importance." While this definition includes a large amount of special recorded information, such as records of marriages and divorces, crimes and punishments, registration of voters, etc., we are considering now only the returns of births and deaths and infectious diseases. The "designated persons" in this case are "practitioners of medicine and surgery," as the law generally designates them, and the "lawfully constituted officers" are the health authorities to whom such returns are made.

That the execution of registration laws meets with greater difficulties than the execution of nearly all other laws in our statutes is a matter of common knowledge among the medical profession, and especially among health officers, and it is important that we should consider what these difficulties are. In the first place we must mark a clear distinction between the return of births and deaths and the registration of infectious diseases, as these two classes of returns are evidently separate and distinct problems.

Let us first consider the return of infectious diseases. To the lay mind this would be considered the less difficult of the two classes to secure. Experience, however, has shown that it is in this class of registration that the greatest difficulty is met, and we can appropriately consider first the difficulties in the way of the registration of infectious diseases. The first and foremost of these (as any one of experience must recognize) is "medical ethics." In the relation between the patient and his physician, our code of ethics, and indeed the statute law of many States, recognizes that certain information furnished the physician by his patient must be held inviolate. This we must recognize, *but within certain limits only*, as a just and proper unwritten law, but it is bad ethics and bad law to hold the individual's rights superior to those of the State. If the code of medical ethics holds that "the rights of the patient are always supreme to those of any other individual, class or community," such a code is a bad one, and undeserving of the name of civilized ethics, and the more civilized code should be substituted, namely, "the rights of the community are always supreme, the rights of the patient are only supreme as long as they do not involve danger or damage to the community." There may have been some justification for the concealment of infectious disease when the unfortunate person who contracted it was regarded and treated very much in the light of a criminal, but in this twentieth century we deal with those cases with justice, temperance and impartiality, and even this justification no longer exists. The *reductio ad absurdum* of such a code would be to hold that, as far as the physician is concerned, no one but the patient has any rights which the physician need consider; or that to guard his patient against the trivial and generally apocryphal injury of registration, the physician is justified in sowing disease and death among the innocent individuals of a community.

The physician is prone to consider himself as a class apart in the community. This is true, but in the opposite sense from which the extremist in medical ethics views it. All occupations are capable of good or bad effects, according as their relation to the community is a good or bad one. The status of the physician who fails to register a case of infectious disease is no different from that of a person engaged in any other occupation who fails to fulfill the obligations imposed upon him by law for the good of his community. Let us cite an example:

A is agent for the local branch of a corporation which we may call, for example only, the Standard Oil of New Jersey. A receives a consignment of gasoline in the city of B from the general manager of the corporation (C) to meet a sudden demand at a high price. Acting under the instructions of C, he stores a quantity of gasoline in the local agency far above the amount allowed by the city of B, and without notification of the proper authority. A destructive fire follows, costing several lives and thousands of dollars' worth of property. When the facts are discovered A's defense is, that he was merely protecting the interests of his employers in saving them from the trouble and expense in which they would be involved if he had complied with the law.

Will the law accept his excuse? Undoubtedly not. Will the general public commend him for his devotion to his employer's interests? We think not. All that he can expect is the sort of contemptuous pity accorded a servile tool. Lest the physician find himself in this unenviable light, let him hesitate the next time his wealthy and influential patron asks his compliance in concealing a case of infectious disease in his family. These remarks apply to the day laborer as well as to the physician, but the physician, in the pursuit of his occupation, belongs (in practically all communities) to a special class, that is, he is following a *licensed* occupation.

As the most extreme and erroneous views are held by those following licensed occupations, especially by physicians, it is necessary that we should clearly point out the nature of these fallacies. The most common fallacy is the view that holds that a class of occupation is licensed for the protection of those engaged in the occupation. Nothing could be further from law or common sense. Such a view would imply the restriction of an occupation for the benefit of a class. As the Constitution guarantees to each individual the right to earn his livelihood according to his own interests and desires, it is clearly unconstitutional to restrain an individual from pursuing the occupation which he elects, unless it can be shown that the pursuit of such an occupation by unskilled persons involves the community in special dangers. For this reason a number of skilled occupations are licensed, because their practice by unskilled persons would involve individuals or small groups of persons in dangers from which they (the individuals), not being specially qualified to pass upon technical knowledge and skill, would be unable to protect themselves. Certain other pursuits must be classified as "dangerous occupations" because their practice by unscrupulous and unqualified persons would necessarily involve the whole community in danger. The justification for the licensing of the medical profession is found under both these heads.

The term "license" thus implies special privilege and special restriction. In the issue of a license by the State there is an implied contract on the part of the State to accord certain privileges to the licensee, and an implied contract on the part of the licensee to obey the laws of the State and to give the State the benefit of his special knowledge. The State does not license any person to violate its laws. In this particular instance the physician is licensed to pursue a dangerous occupation involving the handling of certain dangerous material, to wit, infectious diseases, *only upon condition that he handles them in a manner conforming to law.* The physician is no more at liberty to handle these diseases according to his own whim than is an engineer (a member of another class usually licensed), who is given the privilege of carrying dynamite into a village, to make a bonfire of it in the public square. The position of the physician who fails to register an infectious disease is parallel to the engineer and his explosive bonfire. Innocent persons are liable to be hurt, and the author of the conflagration should not complain if he is scorched by his own work. Mr. Adams, in a recent article in *McClure's*, cited a case reported to him by a minister, one of whose parishioners, a Mr. X, died of tuberculosis. This minister reported the case to the Health Department of his city, which was not lawfully able to take any action, as the case was never registered during the life of Mr. X, and his death was returned as due to some non-infectious disease. The premises were not disinfected and were shortly after occupied by Mr. Y and his family. This was three years ago; Mr. Y is now dead of tuberculosis, and the names of several members of his family will appear later in the death records as sacrifices to the amiable prejudices of some disciple of medical ethics.

Another view commonly held is, that the physician is under no obligation to furnish information for which he is not paid. There is possibly some justification for this view when the physician is required to return more or less elaborate data, such as comprises many of our birth and death certificates; but as regards infectious diseases the physician is clearly granted a license to deal with this class of cases on the tacit understanding, first, that he has the diagnostic ability to recognize these cases when he sees them; second, that he will promptly give the State the benefit of his special knowledge. The physician who encounters a case of this character has thus a double duty: first, his duty as a private citizen to inform the community of a danger threatening it; second, a special duty imposed upon him by the State when his license is granted of giving special information for the general public welfare. With these common-sense principles in view, we would regard the payment of fees for the notification of infectious diseases as tending to establish a principle not only bad, but contrary to public policy. What this "collect on delivery" policy would mean when carried to its logical development will be shown by the following clipping taken from the *Daily Canard* of April 1, 1949:

"NOWHERE, April 1, 1949.—Mr. J., a leading citizen of this town, discovered a fire in the palatial new residence of Mr. Y. on North Buncombe Street. Mr. J. called at the City Hall and, upon receiving the legal fee of $2.98, consented to turn in an alarm of fire. At the arrival of engines near the home of Mr. Y., Mr. J. requested Mr. Y. to pay him the special fee of $13.23 authorized by the Acts of the Legislature of 1947 for directing the engines from the alarm box to the fire. As Mr. Y.'s house had in the meantime been reduced to ashes, Mr. Y. refused to pay him this fee, and the engines were compelled to return without having reached the fire. It is said that Mr. J. will enter suit against Mr. Y. for $13.23 and costs."

The notification of infectious diseases is not, however, exactly parallel to the registration of births and deaths. Should the State allow the physician a fee for his certificate of birth or death? We believe that although the State has the right to require these services of a licensed profession, a fee ought to be allowed. In England a double death certificate is in use. The fact of death must be certified to, as well as the cause of death, each forming a separate and distinct certificate. A fee of one shilling is allowed for each certificate. In the United States fees are allowed for birth and death certificates in many States, and this would seem to be, in our opinion, the proper course. There are two reasons why this custom is not universal in this country: first, because experience has shown that a fee commensurate with the services performed has little influence in improving the quantity or quality of the birth or death returns; second, that legislatures are too parsimonious to spare money for the trivial questions involving the life, health and happiness of their citizens.

These are, however, questions of public policy. The obligation of all these duties the physician accepts with his license. As it is the duty of the citizen to obey the laws under which he lives in prosperity and comfort, so it is the duty of the physician to obey those special laws under which he is licensed to earn his livelihood. The State should, however, for the advantage of all concerned, recognize in a special way by statutory enactment the particular relation between the physician and the public. The first step towards this end is to make physicians' licenses dependent upon an oath similar to that administered to lawyers on admission to the bar. The text of this oath for Maryland is given in the Appendix A.

No one can doubt that in the social organization lawyers and physicians do, and should, form a class apart from all other occupations. The necessity for regulating the practice of lawyers only arose from the fact that they have from ancient times been the guardians of the property, civil rights and liberty of the citizens of the State. The modern physician has a much more important function as the guardian of lives and health. The law should assist in a radical readjustment of the relations between the physician and the State. The physician, before receiving a license, should be required to subscribe to an oath similar to that required of lawyers on admission to the bar, and they should be made a part of the hygienic government as lawyers are made a part of the courts. As lawyers are assigned to defend persons who are unable to provide themselves with counsel, so all licensed physicians should be subject to assignment to attend patients suffering from infectious diseases by the sanitary authorities, and their fee fixed by the latter as the court now fixes the fees of members of the bar assigned to defend prisoners. The Maryland law has been first to recognize this relation of the physician to the community (Chapter 399, Acts of the General Assembly of Maryland, 1904, entitled An Act to protect citizens of Maryland from certain communicable diseases, especially tuberculosis of the lungs and larynx). Sanitation is now reaching the position in our laws which its importance justifies, and the medical profession will attain the prominent position which it should have in the social fabric, by all reasons of public policy, when our physicians are all "just, capable, intelligent and obedient to the laws."

APPENDIX A.

TITLE — ATTORNEYS AT LAW AND ATTORNEYS IN FACT.

Subtitle — Admission to the Bar: Oath of Attorneys at Law.

Every attorney or other practitioner at law shall in open court take and prescribe the following oath or affirmation: *I do solemnly swear (or affirm) that I will at all times demean myself fairly and honorably as an attorney and practitioner at law; that I will bear true allegiance to the State of Maryland and support the laws and constitution thereof, and that I will bear true allegiance to the United States, and that I will support, protect and defend the Constitution, laws and government thereof as the supreme law of the land: any law or ordinance of this or any State to the contrary notwithstanding.* — Section 8, Article X, Code of Public General Laws of Maryland, 1904 (Chap. 5, Sec. 1, 1777).

PUBLIC HEALTH LEGISLATION, NEWS AND NOTES

By F. H. SLACK, M.D.
Assistant Director Boston Board of Health Laboratory

REPORT OF THE HEALTH OFFICER OF THE DISTRICT OF COLUMBIA. In the 1906–07 report of William C. Woodward, M.D., Health Officer of the District of Columbia, attention is called in especial manner to the inadvisability of accepting the *general* infantile death rate as an index to the character of the milk supply of a community, the position being taken that, with the exception of deaths from diarrheal diseases, this is not true. A comparison of infantile mortality rates in the District from diarrhea and inflammation of the bowels from 1880 to date shows a marked diminution, beginning in 1905. After considering the various factors involved, Dr. Woodward concludes it to be but fair to attribute this improvement to the enactment, March 2, 1905, of the law regulating the sale of milk in the District, and establishing dairy and dairy farm inspection.

So far as death rates as a whole may be considered an index of sanitary conditions, the District is shown to be far better situated now than at any previous time in its history of which there is a record.

Typhoid fever during the past four years has been continuously low as compared with the preceding period.

The appendixes to the Health Officer's report give in full the reports of the various officials of the department, together with an exhaustive analysis of the vital statistics of the District by Dr. A. C. Patterson.

BACTERIOLOGIST FOR WASHINGTON. "Dr. Joseph J. Kinyoun has been appointed bacteriologist in the con tagious disease department of the Washington Health Department."* Dr. Kinyoun has been in public health work for many years. Formerly in the Marine Hospital service, he first proved the presence of plague in California while stationed in that district, and his findings, although at that time officially denied by prominent politicians, have since been amply confirmed. Dr. Kinyoun was recalled from California and soon after severed his connection with the Marine Hospital service. For several years he had charge of the Mulford antitoxin and vaccine laboratories. He is connected with the George Washington University, and is at present Acting Chairman of the laboratory section of the American Public Health Association. The Washington Health Department is to be congratulated on having secured his services.

BACTERIOLOGIST AND CHEMIST FOR SAVANNAH. Dr. Victor Bassett of Milwaukee, the winner in a competitive examination, has received the appointment of bacteriologist and chemist for the city of Savannah, Ga.

While there still exists in some American cities and States a feeling that in filling positions of this kind "home talent" should be employed, most communities are seeking to place in charge of their public health laboratories men of the highest training, realizing that incompetence in such a position is a serious menace, and that the public health should not be trifled with for the satisfaction of local pride, prejudice or politics.

Savannah, under the leadership of Health Officer Brunner, sought for the best talent procurable at the price she was able to pay. A widely advertised competitive examination was held simultaneously in several leading cities of the United States, the position being guaranteed to the winner for five years, salary $3,000 per year, and a promise given of immunity from political interference; character, previous experience and training counting 40 points out of a possible 100.

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* Journal A.M.A., June 27, 1908.

Dr. Bassett's work in Savannah will be watched with much interest, his appointment, in a way, marking the beginning of a new era in public health work, and it is probable that the example of Savannah in holding competitive examinations for such positions, and freeing them from political influences, will be followed by other cities.

REPORT OF THE COMMISSIONER OF HEALTH, PENNSYLVANIA, 1905–06. The organization of the Pennsylvania State Health Department, in accordance with the laws of 1905, is now well effected, "the establishment of this department marking a new era in public health administration in the Commonwealth."

The concentration of authority in the hands of a single commissioner "makes possible promptness of action, a matter of greatest importance in the management of epidemics and other emergencies." It also "prevents delays resulting from differences of opinion and vacillation in the exercise of authority."

The new Board of Health is given "increase of authority by the provision of adequate penalties for violation or neglect of the sanitary laws of the State, or the regulations of the department, and of the means and methods of imposing the same."

It also has a "generous increase of appropriation, making it possible to undertake operations, especially in regard to the protection of water supplies, which would before have been impossible."

The first Annual Report of the Commissioner, Dr. Samuel G. Dixon, including detailed reports from the divisions of Medical Inspection, Sanitary Engineering, Vital Statistics, Morbidity Statistics, Antitoxin Distribution, Laboratories and Experiment Station, is a valuable contribution to reliable information and statistics along these lines.

THE PRESIDENT-ELECT OF THE AMERICAN MEDICAL ASSOCIATION. Of interest to all public health workers is the recent election of Col. William C. Gorgas of Ancon, Panama, to the office of President of the American Medical Association.*

"Colonel Gorgas was graduated in 1875 as A.B. by the University of the South, and in 1879 as M.D. by Bellevue Hospital Medical College, where he became a member of the house staff. He entered the Medical Corps of the United States Army in 1880, as First Lieutenant, becoming Captain in 1885, Major in 1898, and Colonel by special act of Congress in 1903, in recognition of his splendid work in ridding Havana of yellow fever. In 1903 the University of Pennsylvania conferred on him the honorary degree of doctor of science. His appointment as chief sanitary officer of the Isthmian Canal Zone, the work he did there in the face of the most trying obstacles and insensate limitations, and his subsequent elevation to an authoritative position as a member of the commission, with the grand results to which the President himself has borne testimony, are matters of common knowledge.

"It cannot fail that his scientific attainments and proved executive ability shall add fresh luster to the already illustrious office of President of the American Medical Association."

FAITH HEALING IN MARYLAND.† "An amendment to the Medical Practice Act in Maryland has just been secured, requiring that hereafter Christian Scientists, faith healers or other sectarian practitioners must be graduates of recognized medical colleges, and must pass the examination before the State Board of Medical Examiners, thereby obtaining certificates as physicians before being allowed to practise.

"In commenting on the new law, the Philadelphia *Telegraph*, March 26, says editorially: 'Maryland will have no more foolishness about faith healing under any sort of sectarian denomination in her borders. No more use of mental or psychologic therapeutics by untrained, untaught practitioners; no more making a trade or profession of dealing with the mysteries of health and disease and the laws of nature for hire by ignorant persons unqualified to handle such problems; no more "absent treatment" for present payment in hers.

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* Journal A.M.A., June 13, 1908.

† The Journal of the Medical Society of New Jersey, June, 1908.

"'It seems to an unbiased mind a most just and reasonable law, not oppressive on any form of faith nor restrictive of any proper rights, but conceived for "the greatest good of the greatest number." The value of mental healing in various forms has been too often and too conclusively demonstrated to be utterly denied with any sort of reason, and where a healer's services are given gratis, either from a general spirit of Christian charity or from special motives of interest and affection, no one can properly protest against a well-meaning effort; but where persons sell their services for hire, and make a practice of it, they should be compelled to give good guarantee of their qualifications and abilities.'"

THE MOSQUITO AND THE HOUSE-FLY AS CARRIERS OF DISEASE. The Health Department of Richmond, Va., publishes and furnishes free, in reasonable number to any of the citizens, an able article by Chief Health Officer Levy, on "The Extermination of Mosquitoes," bearing on the title-page, in large type, these catch words, "No Standing Water, No Mosquitoes. No Mosquitoes, No Malaria."

The common house-fly as a carrier of infectious material is receiving much attention in public health bulletins. The North Carolina Board of Health Bulletin for May contains two excellent papers dealing with "the appalling prolificacy and disease-spreading habits of this filthy pest, and the best methods for fighting him." The *Florida Health Notes* gives a short, catchy, epigrammatic essay on the subject of the house-fly, which should be spread broadcast; it is reprinted in the Monthly Bulletin of the Indiana State Board of Health, and accompanied with a picture of Mr. Fly magnified one hundred times.

The spreading of such articles broadcast cannot but have a beneficial effect upon the general health of the people.

BOOK REVIEWS

The Sanitation of Recreation Camps and Parks. By Dr. Harvey B. Bashore. *John Wiley & Sons, New York.*

This little book contains a number of useful hints in regard to camp sanitation, and is especially valuable at the present time when so many boys spend their vacations in "camps" as a means of gaining health for the winter's school work.

The author has evidently had plenty of experience, and his hints in regard to camping are simple and practical.

The first chapter deals with the location and construction of the camp, and gives advice that is worth heeding, especially in regard to the value of plenty of sunlight and the necessity of a sufficient number of windows. The second and third chapters consider the questions of water supply and the disposal of camp waste. These are worth the attention of the man who is making his camp each night as well as of the permanent camper. The author directs one's attention to the fact, that although a spring or stream may look pure it may be badly polluted, — a fact which is often disregarded. In these days when so many people spend weeks in "the woods" this pollution may be a very real danger.

The camp waste is divided into three classes: combustible, which is burned daily; incombustible (tin cans, etc.), which is collected and ultimately buried; and putrescible, which is put into a garbage hole and carefully covered with earth each day.

As regards the disposal of fæcal matter, the method is the same whether in a temporary or permanent camp, viz., some form of earth closet. In a temporary camp the method is more primitive, being simply a hole in the ground, the fæcal discharge being carefully covered with earth. When camp is broken or the contents of the hole reaches within six inches of the surface it is carefully filled up to grade. In a permanent camp a shack may be built and a pail is used, earth being kept at hand for use. When the pail is filled the contents may be buried or used as fertilizer.

Although not specifically stated, the inference is that the sink or closet is used for urination, a sufficient quantity of earth to absorb the urine being thrown in.

This method has the double advantage of destroying the odor and preventing the breeding of flies. If all parties camping in the woods were to follow these simple rules the danger of camping would undoubtedly be lessened.

The police rules for a camp are worth quoting:

SANITARY RULES FOR CAMP.

1. Open windows must be carefully screened.
2. No food shall stand about uncovered except at meal time.
3. Water in brook or creek must not be used for drinking.
4. All kitchen waste, solid and liquid, must be put in the garbage hole, and covered every evening with earth.
5. The dry closet pail must be emptied frequently and the contents thoroughly covered with earth.
6. The camp closet must be used exclusively; even the "method of Moses" will not be tolerated about this camp.
7. No paper or rubbish shall be scattered about the camp; such material must be collected and burned or buried.
8. Mosquito pools in the brook shall be treated with kerosene every ten days.
9. Weeds and grass must be kept short around the camp.
10. All dead animals found must be immediately buried.
11. For each and every violation of the above rules the fine shall be five cents, except that in the case of Rule 6 the fine shall be one dollar.

In the fourth chapter we are given numerous hints in regard to improving the sanitary surroundings of a permanent camp, such as draining, destroying mosquitoes, etc., and the chapter closes with a few warnings in regard to a number of dangerous plants.

The last chapter is devoted to "trolley parks," and here the author sounds a vigorous note of warning in regard to the dangers which may be encountered. The picture that he draws of the conditions which he had found is sufficient to make the thoughtful man pause, and is worthy of the attention of health officers in localities where such parks are situated.

FRANCIS GEO. CURTIS.

Meat and Food Inspection. By WM. ROBERTSON, M.D., D.P.H. *With Regulations Governing Meat Inspection in the United States.* By MAXIMILIAN HERZOG, M.D. *Illustrated. W. T. Keener & Co., Chicago,* 1908.

This is a short, condensed work of considerable value to health officials and beginners, but of not as much value to the trained inspector of food articles.

Considerable space is devoted to the architecture of cow sheds, dairies, etc., all of which is of interest to one who desires to become acquainted with the general subject.

The description of diseases and reasons for condemnation of food articles is severely condensed.

A great deal of this work is given to the English laws and regulations.

This work is of much value to those whom it was evidently intended for, that is, the general health officer and others who desire to obtain *superficial* knowledge upon a rather large subject.

ALEXANDER BURR.

Typhoid Fever. By George C. Whipple. *Wiley & Sons. Price* $3.00.

This is a very useful work, and may be read with profit by every health officer. Professor Sedgwick supplies an Introduction, which is exceedingly clear and forceful, and sets forth in his characteristic manner the principal modes of the transference of the disease. Mr. Whipple discusses more in detail the different sources of typhoid fever, and gives accounts of very many interesting outbreaks. The book contains much statistical matter and many useful diagrams. The author is, of course, particularly interested in public water supplies, but gives proper consideration to other modes of infection, and considers that the report of cases and careful disinfection of excreta are the most important steps in the warfare against this disease.

C. V. CHAPIN.

The Proceedings of the First Annual Session of the American Association of Medical Milk Commissions.

The development of milk commissions, their objects and methods, are well known to our readers. Usually officered by physicians, they accomplish a work, by means of rewards and (deprivatory) punishments, beyond the scope of official health departments, which must wait for legislation before they can act officially, and cannot exercise selection. Acting as a "private corporation" under the powerful and wholly altruistic rule of medical men of high standing, they have taken excellent advantage of the free hand which the private corporation usually has to establish standards, and *to select* from those who meet these standards those with whom they will deal.

In accordance with the modern trend for uniformity of procedure, twenty-two of these commissions met at Atlantic City, June 3, 1907, to discuss common problems and to agree on uniform and efficient methods for meeting them. Both the spirit and the results of this meeting are beyond praise. A second meeting was held June 1, 1908; the report of the first meeting only is as yet available. These can be secured through the secretary, Dr. Otto P. Geier, 124 Garfield Place, Cincinnati, Ohio. Dr. Henry L. Coit, 277 Mt. Prospect Avenue, Newark, N.J., is president. All who are interested in the subject, especially those concerned in conducting milk commissions or contemplating establishing such work, should secure a copy.

H. W. HILL.

Thermal Deathpoints of Pathogenic Micro-organisms in Milk. By M. J. Rosenau. *Hygienic Bulletin No.* 42, *January,* 1908. *United States Public Health and Marine Hospital Service.*

This excellent piece of work, devoted to a redetermination under practical conditions of the thermal deathpoints *in milk,* of several pathogenic organisms of epidemiological importance resulted in the conclusion that 60° C. (140° F.), maintained for twenty minutes, is entirely reliable for the destruction of the infective quality of milk containing tubercle bacilli, typhoid bacilli, diphtheria bacilli, cholera spirilla, dysentery bacilli and the micrococcus of Malta fever. Of these the typhoid bacillus requires only two minutes at 60° C., the diphtheria and cholera organisms even less. It is, nevertheless, well that the twenty-minute rule should be adopted in all advice relating to this subject. It must be remembered, also, that in practice an unvarying temperature of 60° C. in trained hands can rarely be counted on, and it would be safer to recommend 150° F.; for one reason, if for no other, that the ordinary "lay" thermometer is likely to be "off" anywhere from 1° to 10° F.

H. W. HILL.

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EDITORIALS

IT IS TIME TO ACT

AUTHORITY to make and enforce laws for the protection of the public health is part of the police powers of every government. It does not depend upon any express grant, but is an incident to government itself. It was adherent in each of the thirteen sovereign States when they, by the delegation of certain of their powers, created that part of the government of this country known as the federal government, in contradistinction from that other part known as our State governments. And as the police power was not among the powers thus delegated, the right to make and enforce laws for the protection of public health still resides in the State governments and is not vested in the government of the United States, except in so far as relates to those parts of our country that are not under State control. It follows, then, that no federal public health service can displace the States' services, or in any way limit their jurisdiction, and, therefore, it follows further that no federal public health service can be in any large degree successful which does not lend itself to the upbuilding of States' services where upbuilding is necessary, and to the bringing about of coöperation amongst the States' services themselves and between them and the federal service, and which does not win their support, respect and sympathy.

The federal government is in a large degree powerless in the making and enforcing of public health laws, but there are functions of government over and beyond the mere making and enforcement of criminal statutes. Because the government cannot put itself into a position where its officers can prosecute its citizens because of offences against the public health, it does not follow that the government has no interest in the conservation and promotion of the health of its people. Every government has an interest in the health of its people; and most of all has our government such an interest, for one of the very purposes for which it was created was to provide for the common welfare, and health is the corner stone upon which all welfare whatsoever rests. The federal government cannot regulate education; yet it endeavors to foster education and maintains a bureau for that very purpose. It cannot regulate agriculture; nevertheless it endeavors to promote agricultural interests, and to that end has created one of the most extensive of the government establishments. It cannot regulate labor; but its bureau of labor has long been recognized as an essential part of the government machinery. And what the government has done and is doing for education and for labor and for agriculture, it can do for public health. Refusing any longer to tack public health functions on to the work of this bureau and that, scattering them without any effort at correlation whatsoever, it can frankly admit its interest in the health of its people and claim its rightful jurisdiction in the premises by creating a proper bureau for the discharge of public health functions.

As to what constitutes a proper bureau for the discharge of public health functions we are unfortunately not agreed. Because of varying degrees of information concerning the subject, of varying degrees of self-interest and of varying points of view, we entertain divergent opinions, which we seem to be unable to reconcile one with another. But the factors which cause physical inefficiency and disease are hindered by no such lack of harmony among themselves, but with a singleness of purpose, well worthy of emulation, are working night and day toward the same unchanging end, disease and death. The problem is a large one and its ramifications are numerous. The most that can be hoped for at the present time is a step in the right direction, and for the attainment of our ultimate goal we must expect to wait for no inconsiderable period. None of us must be disappointed if he does not see all of his ideals embodied in the legislation the enactment of which we are confidently looking forward to during the coming session of Congress. If such legislation be but a substantial move in the right direction, we can safely leave to the future the right growth of the service. If a false step be taken, progress will be accordingly hindered. It behooves each of us, then, to watch closely the trend of events and to lend his best efforts to the framing and the enactment of right legislation, and to the opposing of legislation of any other kind. Failure at the present time can be due only to inertia and lack of organization among public health workers.

WM. C. WOODWARD.

NOTE. — The Editors believe that the Committee of Seven, representing the American Public Health Association, and therefore the professional hygienists of this country, and the Committee on a Federal Department of Health of the same Association should seriously take upon themselves, for the professional hygienists, the watching of legislation and the notification of members of the Association of the progress of events. It is time to ACT.

PERSONAL *VS.* PUBLIC HYGIENE

It has been said that personal hygiene is the basis of public hygiene; that if *every individual* practised the rules necessary to the escape from infectious disease, public hygiene, chiefly concerned with preventing the spread of infection, might go out of business. It is true that personal hygiene, in its larger sense of correct physiological living, has probably no one established set of rules, or rather, as Richard Cabot has said, there needs must be a dozen, perhaps fifty sets of rules to fit different types of people and conditions of life. But so much of these rules as relates to the defence against infection would be uniform for all types of people and, in fact, might be condensed to one rule, "*do not swallow* (or inhale or touch) *the discharges of others*," for in a large, general way almost all of our infectious diseases are transmitted by taking the discharges of others into the mouth.

If this one rule alone be necessary to the abolition of infectious diseases, why not abandon the elaborate mechanism of public health work, with its many subdivisions, technicalities and intricacies, and devote ourselves wholly to teaching it?

The man who lives on his own estate may indeed prevent, for himself and his family, "the swallowing of the discharges of others" by a rigid asepticism concerning food, milk, eating utensils, hands of attendants, own hands, etc., *because he has full control.* For such a man public hygiene need not exist, so long as he remains within his own grounds. But let him travel or even go to his city office, let his family attend church, school, theater. At once begins contact with persons not of their household; hands, rooms, perhaps food, water, eating utensils, not under their control, all bearing in some form or manner traces of the discharges of others. The cordon is broken.

The waiter at the hotel breakfast room may be nursing a brother with typhoid, the waitress at the noon lunch counter may be a diphtheria carrier, the chambermaid may have tuberculosis, the Pullman porter syphilis, the milk may be infected with scarlet fever, the schoolmate may have almost anything. By a thousand insidious pathways they touch, inhale and swallow discharges of many persons. True, the chances of infection are small, for the amount of discharge so conveyed is usually infinitesimal, and in the majority of cases uninfected, and natural resistance, if unimpaired, will counteract much infection. But multiply the chances one individual takes in a day by the number of individuals taking them and the result is the annual morbidity and mortality tables concerning the infectious diseases.

It is at the point where the individual and his family leave the domain which they may control, that public hygiene steps in or should step in. Public hygiene says, or should say: "What you do for yourself at home we do for you in public; the foods from public sources, and especially the milk, are free from the discharges of other persons or animals, at least of those sick from infectious diseases; the waiters and waitresses are known, medically inspected and have no sickness in their families; the schools to which you send your children, the public conveyances in which they ride, the barber who shaves you, the school children your boys and girls meet, these are all medically uninfectious; the ventilation of public places is good, and the water supplied you is non-poisonous."

No public hygienist can dictate to the individual in his own home how he shall live physically, any more than morally; both personal hygiene and personal morality are matters for personal teaching and "moral suasion." But the public hygienist can and should see that the *public* purveyor of food and drink, and of all personal service of every description, is free of infection. Medical school inspection, begun in Boston, is well. We await the extension of the same principle, to the same ends, for all public personal service, including all purveyance of food or drink, believing that in this lies the justification as well as the chief domain of *public* as contrasted with *personal* hygiene. The suppression of epidemics early and with small loss is a great achievement, a much greater one is to so conduct public affairs from the standpoint of public hygiene that there are no epidemics to suppress.

H. W. HILL.

AMERICAN PUBLIC HEALTH ASSOCIATION*

PRESIDENT'S ADDRESS

DR. RICHARD H. LEWIS, Raleigh, North Carolina

Members of the Association, Ladies and Gentlemen:

When as a boy I read Ballantyne's story of "The Young Fur Traders," a story dealing with the operations of the Hudson Bay Company, the central scene of which was laid on the very spot where we are assembled today, then Fort Garry, I little dreamed that the time would come when I should appear here as the head of a great international society. In the wildest flights of my youthful imagination it never occurred to me that Aladdin with his wonderful lamp would wander so far from home and evoke a *génie* who in a night, as it were, would transform the birch-bark canoes into steamboats, the sledges and pack trains into railways, the *voyageurs* and trappers into captains of industry, the wilderness into a sea of golden grain to feed the nations of the world, and the little trading post into this splendid city. Yet such is the accomplished fact, although we may feel that the good *génie* has scarcely more than begun his work, and the boy of forty odd years ago stands before you and begs to express his profound appreciation of the great honor you have conferred upon him, the result, he must feel, rather of the partiality of your kind hearts than the better judgment of your intellects.

As you are no doubt all aware, the President of the United States called a meeting at the White House to consider the vital question of the conservation of the natural resources of the country, which are being wasted with such lavish prodigality as to make the judicious grieve and the wise to take alarm. Primarily the invitations to the conference with the President were extended to the governors of the States and Territories of the Union, each to bring with him three leading citizens as advisers, the two Houses of Congress, and the Supreme Court; but later the scope of the meeting was enlarged and one representative from each of the leading national organizations in any way interested in the problem was included. Such an invitation was sent to your President, as the representative of the American Public Health Association. The meeting was held May 15–18 in the East Room of the White House. I attended and was much impressed with the personnel of the membership, and with the papers and discussions to be expected of men of such prominence. Following the White House conference, President Roosevelt appointed a National Conservation Commission, with the Hon. Gifford Pinchot as chairman. The coöperation of the various organizations represented at Washington with the Commission is desired, and I learn from Bulletin No. 2, recently issued by the Commission, that a number of national organizations have responded by appointing special committees to act in coöperation with the Commission. I would recommend that we take similar action.

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* According to the agreement between the American Public Health Association and the editors of this journal, the Publication Committee of the Association is responsible for the arrangement of the papers, which are printed in the order in which they are received.

The subject of such wide scope as to make it worthy of consideration by an association of this character, which is exciting most interest at the present time, in my own country certainly, is the development of a national department, or bureau of health.

The Republic of Mexico, being a confederation of free and sovereign States, the conditions prevailing there are very much the same as with us, although greater progress in the centralization of sanitary powers has been made. The Supreme Board of Health is analogous to our Public Health and Marine Hospital Service, with much the same functions. But the report on this subject by Dr. Liceaga, the Chairman of the Committee for Mexico, has been received and will be read to you.

The Dominion of Canada, while it has a Director-General of Public Health, thus emphasizing the federal or national idea, has no single national department of public health, but the agencies of the general government having executive powers in the administration of the laws of sanitation are scattered through several departments. So the conditions obtaining in the Dominion are quite similar to those in the United States, and possibly what I shall say in discussing the problem as it exists in my own country may throw a side light, feeble as it doubtless will be, upon theirs.

It would be a work of supererogation and a dealing in platitudes to reiterate to such an audience as this, composed as it is of the leading sanitarians of North America, the general arguments for the establishment of a national department or bureau of public health with which we are all so familiar. There is no question of the need of such a department. What we all want, as guardians of the public health, is a central or national organization worthy of the dignity, power and resources of our respective countries — the very best that brains and money can produce.

Dr. Charles Harrington, in his very able oration on State Medicine, entitled "States' Rights and the National Health," delivered at the recent meeting of the American Medical Association, has called attention to the difficulties attending the ideal administration of a national department of public health in the United States resulting from the dual nature of the government, — the power possessed by the several States under the Constitution to prevent the interference of the Federal government in their local affairs. To my mind these objections, certainly in the present stage of our sanitary development, are more academic than practical. As a matter of fact, the importance of this phase of the subject really depends upon the character and functions of the national bureau we desire. Do we desire a bureau with full executive powers or one of an advisory character, but endowed with authority and means to assist and coöperate with the States and municipalities upon request, when the urgency of the situation is such as to make help necessary, not only for the protection of the community affected, but of the whole country, or at least of a considerable part of it? A bureau, with full executive powers, is not only impracticable but undesirable. If general executive powers should be exercised by the national bureau in the States independent of the State boards of health, it would surely result in the weakening of all, and in the probable destruction of many not already strongly establishd. It is unquestionably to the interest of the general cause that each State should look after its own health work, acting always, however, in a spirit of cordial coöperation with the great national bureau, which spirit the latter should be very careful to foster and encourage in every way, not only in its own interests, but in that of the whole country. It would not be at all difficult to so conduct the national bureau as to have the State boards look to it as both guide and friend. Indeed, such is largely the fact now, certainly so far as my own State is concerned, in its relations with our present bureau. The invaluable assistance rendered the city of New Orleans and the surrounding country by the Public Health and Marine Hospital Service in the epidemic of yellow fever in 1905, and to San Francisco and California in fighting the bubonic plague, strikingly illustrates this position. This bureau is already charged with interstate quarantine and, as we have seen, it can practically aid in stamping out epidemics within the States, notwithstanding the doctrine of States' rights. The fact that no provision is made for the expenditure of money in this work, beyond the salaries of its officers, can be remedied by legislation, I am sure. Under our Constitution the governor of a State, in case of an insurrection of such proportions as to successfully defy the powers of the State, can call upon the President of the United States to send to his aid the thoroughly trained troops of the Regular Army. Now our business is that of war, — war against a foe so numerous and so armed with the agencies of disease and death as to make an army with banners pale into insignificance. Indeed, if we could see the waving of the banners and hear the roll of the drums, and the shouting of the captains, there would be no difficulty in securing men and treasure to defend our firesides. It is because the enemy we have to fight is so still, so secret and, to the uneducated mind, so mysterious, that it is extremely difficult, as we all know, to get the people to realize the danger; and just here, in this lack of faith, through ignorance, we encounter the fundamental difficulty in the administration of sanitary laws. But in great epidemics the evidence is so plain that the people wake up and they are ready to call for help from any source and, as we have seen, they can secure it from the national bureau. So, practically, in my opinion, the States' rights difficulty is not a serious one.

In a general way the kind of national bureau of public health we ought to have, and the kind I think most of us desire, is one including within its scope and management all the specific health agencies of the government now in existence, with the addition of others when needed, so thoroughly manned by the best men in their respective departments and so richly endowed with funds that work of the highest class in demonstrating the principles underlying all subjects bearing upon the public health can be done. Having, by the study of the work of others and by original research, settled upon the correct principles of sanitation, it should make a practical application of them to the actual everyday problems of preventive medicine in the sanitary management of the District of Columbia and the Territories over which the United States has absolute control; it should give, so to speak, a clinical demonstration of the best methods as carried out by its own thoroughly educated and trained health officers. The city of Washington should be made a model of sanitary management for our larger cities (I was gratified to learn that Mr. Taft has advanced this same idea), and similarly the smaller towns, villages, hamlets and rural communities of the District should be made models for others of like character. Health laws can best be administered by a benevolent despotism, and as the people of the District of Columbia have no voice in its government, the principles of sanitation could be applied there *secundem artem* as in no other part of the country.

But it is as a source of information and education that we will find the chief value of the bureau: first, in the education of its own officials and the health officers of the country; second, of the medical profession; and, third, of the people.

In a bill now pending in Congress, further enlarging the powers and duties of the Public Health and Marine Hospital Service, authority is given for the establishment of a school of hygiene for the training, free of charge, of such health officers as may choose to attend. The granting of certificates is allowed, but it should go further and grant the degree of Doctor of Public Health, as is done in England. In this way we might hope for the gradual development of a sanitary profession of equal dignity with that of medicine or the other regular professions. But it should not stop there. In conjunction with the army and navy it should conduct a school of tropical medicine. Since our country has come into possession of territories in equatorial regions, special training in the prevention and treatment of diseases peculiar to the tropics should be given all health and medical officers liable to be assigned to duty in such latitudes. At present to obtain thorough training in this branch of medicine we must go abroad.

The natural, logical and, if interested, most efficient teacher of hygiene to the people is the family physician, but we all know too well the general apathy and indifference of the medical profession as a whole on this subject. Their cordial coöperation would be worth everything else, and an earnest effort should be made to interest and at the same time instruct them in hygienic principles and practices by the issuing of a monthly bulletin especially prepared for the purpose and regularly mailed to every doctor in the country.

The education of the people would have to be accomplished through the distribution of literature and by popular lectures. A literary and lecture division should be the principal division of the bureau. The literature, in the form of circulars, should be carefully prepared and written in a style to appeal to the popular mind, and special articles should be written for the children of the public schools. The bureau, having the franking privilege, could have the mail carriers, urban and rural, leave a circular at every house, and it would, moreover, being a part of the Federal government, have the right to put up in the post-office buildings placards setting forth the general rules of health as well as the rules for special diseases. In this way all the people of the country could be enlightened on every subject bearing upon the public health at a relatively trifling cost. The State boards of health are, for the most part, debarred the use of this plan of campaign, because they cannot, in the first place, obtain the addresses of all the people, and if they could they would not have the money to pay the clerk hire and postage; besides, they are not permitted to put up notices in post offices.

To illustrate the practical working of this scheme, let us suppose an outbreak of diphtheria in Smithville, say. As soon as the secretary of the State Board of Health is notified he could wire the head of the national bureau, "Epidemic of diphtheria in Smithville. Please circularize that community;" and all the people would be immediately supplied with the most authoritative literature on the subject when deeply interested in it; it would be striking while the iron is hot, and an impression would be made. But education by circular is not sufficient. It should be supplemented by word of mouth. A corps of lecturers, good talkers from any calling, should be maintained. Having been thoroughly prepared in the School of Hygiene and fully equipped, they should be sent abroad through the country as evangelists of health, to such States as might ask for them.

After all is said, the education of the people is the most important feature of the hygienic problem, and it is not unreasonable to believe that if such a plan as I have imperfectly outlined were vigorously and earnestly pursued there would be created within a decade a favorable public opinion that would be irresistible.

A *sine qua non* in the administration of the bureau is money, and plenty of it. This leads me to suggest a method by which this can be made, or at least saved to the people by the bureau itself. Mr. Samuel Hopkins Adams, in an article on the "Guardians of the Public Health," in the July number of *McClure's Magazine*, says that the State of Massachusetts saved to its people in one year $210,000, $74,000 more than the total appropriation for the public health work, by the free distribution of vaccine and antitoxin made in its own laboratories. The United States Hygienic Laboratory is already making anti-rabic virus. If it were to extend this line of work to vaccine, antitoxin and the curative serums for distribution to the people of the whole country it would save, basing the calculation upon the ratio of the population of Massachusetts to that of the Republic, $7,000,000, which would be more than enough to cover an appropriation worthy of the great bureau we desire, — an amount, by the way, just equal to that annually expended by the Agricultural Department on animal and plant diseases. But even if supplied at cost it would mean a very great saving to the people. It is not necessary, however, to work for an appropriation in this way. When we consider that the government expends more than two hundred million dollars upon the army and navy in preparation for the potential attack of a foreign foe, the people certainly have the right to demand the appropriation of two or three per cent of that amount to fight the actual enemies that constantly surround us, and which, at one time or another, unless checked in their advance, will surely bring disease and death into every family in our land. To us on the firing line this is all too plain for argument, but it is not so with the people nor with our representatives in Congress. They must be educated to realize its importance. Our own Association has done much towards this end by blazing the way and fostering and encouraging various movements in the interest of the public health; the different boards of health, State and municipal, and the medical societies of the country, with the American Medical Association in the lead, have done their part; but it must be confessed that no organization has accomplished so much in so short a time as the American Health League, the outgrowth of the Committee of One Hundred of the Association for the Advancement of Science. The explanation of this is chiefly the composite character of its membership,—the fact that influential laymen of all walks of life are represented. The securing the insertion into the platforms of the two great political parties of a plank favoring the establishment of a national bureau of health and the personal indorsement of the same by both of the candidates for the presidency was a master stroke. While greatly aided by our own able and astute McCormack, certainly so far as the Democratic party is concerned, the chief credit, I am sure, is due the Health League. Politicians look askance at the demands of a single class of the population, and I seriously doubt if we sanitarians and doctors alone could have secured it, even if it had occurred to us to try. While we know that planks in political platforms often prove very weak when we come to build on them, still the very fact that such a declaration has been made will be of much value in educating public opinion, but especially in its influence on members of Congress. Every politician claims to stand upon the platform of his party, and this will make it much easier to secure their support of the legislation we are seeking.

The practical question before us, however, is what is the wisest course for the Association to pursue in order to aid most effectively in obtaining the nearest approach to the national bureau of public health we desire that is in reach? Unquestionably, in my humble judgment, it is to definitely and positively indorse the Public Health and Marine Hospital Service, advocating at the same time its further enlargement by the transfer to it of such health agencies in other departments as legitimately come within the jurisdiction of such a bureau, and by new legislation.

By the establishment in 1901 of the Hygienic Laboratory for the "investigation of infectious and contagious diseases and matters relating to the public health," with its divisions of bacteriology and pathology, medical zoölogy, pharmacology, chemistry and scientific research, the public health functions of the Marine Hospital Service were greatly increased. These were further augmented by the passage in 1902 of "An Act to Increase the Efficiency and Change the Name of the United States Marine Hospital Service." By this act, changing the name to the "Public Health and Marine Hospital Service of the United States" and extending its scope, a national bureau of public health was established, imperfect and incomplete though it was, provision being made therein for the coöperation of the health forces of the country at large by requiring an annual conference of the Surgeon-General with delegates from the State and territorial boards of health. Yet more amplification is proposed in a bill "To Further Protect the Public Health and Impose Additional Duties upon the Public Health and Marine Hospital Service," which has passed the Senate and is now pending in the House of Representatives. This bill materially increases the scope and usefulness of the bureau, providing, as it does, more fully for the investigation of disease, the diffusion of the information thus obtained, the extension of the conference with the State health authorities by authorizing special conferences with representatives from not more than five States, with pay by the government, the appointment of a sanitary engineer and a legal adviser. Nothing is said in the bill, however, about payment by the general government of a *per diem* and of the traveling expenses of the delegates to the annual conference of the Surgeon-General with representatives of all the State boards of health, required by the act of 1902. I am unable to see the reason for this discrimination in favor of the special conferences as against the general. I believe it to be a mistake, for two reasons: first, because in many of the States the appropriations are so small as to preclude this expenditure, and it is just these backward States that are most in need of the inspiration that would come from the meeting, not only with the Surgeon-General, but with the leading sanitarians of the country. As a matter of fact, since the attendance has only on one occasion barely exceeded half of the States the conference has been incomplete. But the principal objection is that this kind of half-hearted invitation, this simple announcement that there will be a conference with the State boards, and that they can send delegates at their own expense if they wish to, fails to secure that feeling of interest and cordial coöperation that would result if the delegates realized that they were, in a certain sense at least, an actual part of the great national health machine. This feeling would be still further strengthened by the adoption of the suggestion made by Harrington in the address already referred to, that these delegates be appointed for a term of several years.

Fearing to impose too much upon your patience I have omitted reference to many other valuable features, but enough has been said to show that we already have a bureau of public health of considerable proportions, one that only needs amplification and strengthening to make it the great bureau we have in mind.

But a second and more vital reason for the indorsement advised is, that if we refuse to accept the existing bureau we will, unless I am very much mistaken, get nothing. The repeated failures of the great American Medical Association to obtain a national department of public health with a secretary in the Cabinet have demonstrated the futility of that project; and any attempt to secure a new bureau against the combined opposition of the Public Health and Marine Hospital Service and the other departments involved, upon which we might surely count, would, I am confident, meet with the same sad fate. But if our own able committee on this subject, already appointed, and the similar committees from the American Medical Association and the Health League shall work harmoniously together and, after conference with Surgeon-General Wyman and the heads of the other departments that would be affected, securing in advance, if possible, their assent to the changes proposed, shall draw a bill that will appeal not only to the patriotism but to the common sense of the members of Congress, as being both sensible and reasonable, and clearly promotive of both efficiency and economy in the administration of the public health forces of the general government, I believe it would pass. I am confident that we can depend upon our committee to do what is wisest and best.

In conclusion I wish to say that I feel that we have good reason to take courage and go forward. The signs of the times are auspicious; the spirit of hygeia seems to be in the air, the people are waking up from their lethargy, and it is not too much to hope that we are now entering upon a period which will be known in the histories of our several countries as the Age of Hygiene.

REPORT OF THE JOINT COMMITTEE ON MAILING INFECTIOUS MATERIAL

The Committee has carefully examined Order No. 677 from the Postmaster-General, dated December 27, 1897, amending Order No. 88 of February 5, 1896, prescribing the conditions under which specimens of diseased tissues may be admitted to the mails.

The Committee makes the following recommendations:

The Committee recommends the adoption, without change, of so much of the general regulations as is given below.

> Specimens of diseased tissues may be admitted to the mail for transmission to United States, State, or municipal laboratories only when enclosed in mailing packages constructed in accordance with the specifications hereinafter enumerated: Liquid cultures, or cultures of micro-organisms in media that are fluid at the ordinary temperature (below 45° C. or 113° F.) are unmailable. Such specimens may be sent in media that remain solid at ordinary temperatures.
>
> Upon the outside of every package shall be written or printed the words "Specimen for Bacteriological Examination. This package to be treated as letter mail." No package containing diseased tissue shall be delivered to any representative of any of said laboratories until a permit shall have first been issued by the Postmaster-General certifying that said institution has been found to be entitled, in accordance with the requirements of this regulation, to receive such specimens.
>
> Specifications for the construction of packages for safely conveying through the mails pathological specimens for bacteriological examination for diagnosis in cases of suspected diphtheria, tuberculosis, and other communicable diseases.

In regard to the transmission of specimens for the diagnosis of infectious diseases, the Committee recommends that special regulations be adopted for the specific diseases in question, both because certain of these specimens can be transmitted through the mails without danger and because the present regulations are not sufficiently intelligible or explicit to furnish a proper guide to boards of health. It will also be manifest saving to relieve boards of health from the necessity of conforming to stringent regulations in transmitting relatively harmless materials through the mails. The Committee recommends amendment of the present regulations to read as follows:

1. TUBERCULOSIS. Specimens of sputum are to be transmitted in a solid glass vial, with a mouth not less than one inch in diameter, closed by a cork stopper or by a metallic screw top, protected by a rubber or felt washer. The glass vial to be contained in a cylindrical tin box; said box should be made of I. C. bright tin plate, soldered joints. This box to be closed by a metal screw cover and a rubber or felt washer or tightly fitting sliding metal cover. The glass vial contained in this tin box shall be completely and evenly surrounded on all sides by absorbent cotton closely packed. The cylindrical tin box with its contents shall be placed inside a larger cylindrical tin box prepared in exactly the same manner as the inner box previously referred to, excepting that the larger tin box shall be lined on the inside of the sides and bottom with compressed paper not less than three-sixteenths of an inch in thickness, in such a manner as to snugly fit the inside tin box.

Specimens of sputum received in carbolic acid shall be prepared as described for specimens not so treated, excepting that the outer tin box may be dispensed with.

2. DIPHTHERIA. Specimens containing material, removed by swab or otherwise, of secretions for diagnosis taken from persons suffering from diphtheria or suspected to be suffering from diphtheria shall be prepared as follows: If such material be transmitted for diagnosis upon the original swab, the infectious material shall be placed within a test tube and closely stoppered with cotton, to be completely surrounded by cotton and to be packed in a cylindrical tin box in the same manner as described for mailing specimens

of tuberculosis sputum, excepting that the outer cylindrical tin box may be dispensed with.

If specimens of diphtheria be transmitted through the mail upon blood serum, or other material used as a culture medium, the preparation of the specimen must be made in the same manner as required for tubercular sputum, excepting that a test tube, stoppered with cotton and the open end covered with a tightly fitting rubber cap, may be substituted for the glass vial specified above.

3. MALARIA AND TYPHOID FEVER. Specimens of blood transmitted through the mails for the diagnosis of malaria or for the diagnosis of typhoid fever by the Widal test may be transmitted in any strong mailing case which is not liable to breakage or to loss of the specimen in transit. Specimens of blood from a person suspected or known to have typhoid fever and transmitted through the mails in bile or other liquid medium shall be prepared as prescribed for specimens of sputum, excepting that a test tube closed by a rubber stopper, and either sealed with paraffine or covered with rubber cap tightly fitting, may be substituted.

4. OTHER COMMUNICABLE DISEASES. Specimens for the diagnosis of all other infectious or communicable diseases shall be prepared in the same manner as provided for tubercular sputum, excepting that a test tube prepared as hereinbefore provided may be substituted for the glass vial.

5. BUBONIC PLAGUE AND CHOLERA. The transmission of specimens through the mails for the diagnosis of bubonic plague and cholera is forbidden, excepting upon written authority of the Postmaster-General, and under such rules and regulations as he may prescribe.

6. PATHOLOGICAL SPECIMENS AND DISEASED TISSUES. Pathological specimens and diseased tissues taken from the bodies of animals or human beings may be sent under the same regulations which are provided as for the diagnosis of the diseases from which the human beings or animals are suffering, excepting in a case of typhoid fever in which the tissue or organ must be prepared in the same manner as provided for tubercular sputum.

7. SPECIMENS OF NON-INFECTIOUS TISSUES. Specimens of non-infectious tissues must be prepared in accordance with the regulations of the Post-Office Department for mailing liquids and perishable articles.

Respectfully submitted,

(Signed) MARSHALL LANGTON PRICE.
JOHN F. ANDERSON.

Municipal Health Officers' Section

IMPROVEMENT OF THE MUNICIPAL SANITARY INSPECTION SERVICE

By **HENRY MITCHELL, M.D.**
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The hazy views and opinions which have in past years prevailed relative to the scope and detail of municipal sanitary operations have not yet been altogether dispelled, although a much clearer and better understanding of the limitations which should guide governing bodies in municipalities in their efforts to promote the comfort and convenience of citizens is gaining acceptance in progressive localities, and many communities are undergoing a process of emancipation from the conditions which prevailed in this country a half century ago, when the enforcement of sanitary laws and ordinances was intrusted to peace officers and political appointees, whose lack of knowledge of public hygiene was one of their most distinguishing qualities. The unwise and inconsiderate attempts to employ the machinery of the health department to right wrongs of all sorts and descriptions has, to a considerable extent, retarded progress, for in numerous localities ill-advised and unreasonable proposals to make use of the health board to abolish annoyances, redress grievances and effect social reforms, disregarding the absence of legal authority for such action, has occupied much of the time of sanitary officials, with none but negative results, and it is gratifying to observe the progress which is now being made in the disentanglement of puzzling municipal problems, and the assignment of appropriate duties to the various branches of city government. Unquestionably certain defects in house construction have unfavorable influences upon morbidity and mortality, mainly, perhaps, because of insufficient provision for fresh air and sunlight, but so also have narrow and unclean streets, smoke nuisances, noise nuisances and other sins of densely populated districts; and yet experience has shown that the regulation and improvement of these conditions can, in the larger towns, best be effected by the governing body itself, through its appropriate committees or bureaus or departments especially created and equipped to deal with these questions. It should be enough for municipal boards of health to limit their operations to those measures which have for their direct and obvious purpose the protection and promotion of the public health, rejecting applications for action in the case of property nuisances and personal discomforts which cannot be shown to actually cause disease.

Doubtless sanitary officials have themselves been largely responsible for misguided activity, but a cure is effected when frequent conferences can be arranged with more experienced officers from other districts who, it may be, have gained wisdom by defeat in efforts to accomplish ends which, though perhaps highly commendable and desirable, can be lawfully attained only through other channels than those provided by the health laws.

When a source of infection has been unmistakably ascertained, as, for example, the transmission of the malarial organism by mosquitoes, or the conveyance of the typhoid bacillus by flies, the health department should specify the measures to be employed for relief, but not in all cases is it advisable that the service necessary for the removal or abatement of the nuisance shall be performed by or under the supervision of sanitary officers, for as soon as the experimental stage in dealing with these and similar hygienic problems has been passed, the city should, as a routine service, cause the requisite labor to be performed to prevent a continuance of the nuisance and the consequent dissemination of the infection, having consideration only for efficiency and economy, and municipal health departments have been gradually released from the immediate supervision of the removal and disposal of excreta, waste fluids, garbage and rubbish, their energies being conserved for the detection of obscure sources of danger to the public health, the discovery and removal of which cannot be safely intrusted to unskilled agents.

It may be stated, as a general proposition, that action by sanitary departments for the abatement of nuisances prejudicial to the public health, except in cases of extraordinary emergency, should be conducted by application to the court for a restraining order directed against the offending parties, or by legal procedure for recovery of the penalty prescribed for violation of the local sanitary regulations, and individuals or corporations responsible for the creation or maintenance of a nuisance prejudicial to the public health should thus themselves be compelled to cause the necessary labor and materials to be furnished, at their own expense, and cause suitable and proper measures to be employed for the removal or abatement of the nuisance.

While the removal of unhealthful conditions is universally admitted to be of vital importance to the welfare of the city and State, politicians and taxpayers have not yet generally consented to select for this service, regardless of all other considerations, men of high mental endowments, and who have received an education and training adapting them to the practice of the speciality to which they are to be assigned, nor has the compensation for such services been generally fixed at a figure which will give to appointees in city health departments freedom from anxiety concerning domestic considerations relating to house rent, food, clothing, etc., and leave them at liberty to devote their attention solely to official duties; but the diminished morbidity and increased longevity which have, in recent years, resulted from well-directed sanitary operations, particularly laboratory investigations, procedures for securing cleanliness in the collection and distribution of milk and for the extermination of insect carriers of infectious organisms, have aroused public interest, and have forcibly demonstrated the value of the unostentatious, faithful and efficient work of sanitary officials.

Men who have enjoyed the privilege of a medical education, preliminary to a comprehensive course of instruction in municipal sanitation, and have thus become masters of the various subjects which enter into the art of public hygiene, constitute the class from which the best services in preventing the spread of infectious diseases may be obtained; and it is from this class that executive health officers will finally be drawn.

In New Jersey the statutes and judicial decisions* expressly require that health boards shall confine their operations to the removal or improvement of conditions which affect the public health unfavorably, and under the laws of that State members of municipal boards of health are, in effect, jurymen, selected under the law to sit in judgment concerning conditions suspected to be, or which are known to be, injurious to the public health. Action was first taken by the State Board of Health of New Jersey for improvement in the grade of municipal sanitary officers in 1896, by the introduction of a legislative Bill. This Bill failed to pass. In 1897 further unavailing action was taken, and in January, 1898, upon the solicitation of the State Board of Health, the trustees of Rutgers College announced that examinations to test the fitness of applicants for appointment to serve as sanitary inspectors would be conducted quarterly, and that certificates of competency would be issued to those who were found to be qualified for employment in the work of local boards of health. Some progress was made under this arrangement, and in 1901 another legislative Bill to improve the sanitary service was introduced and lost. In 1903, however, a Bill for this purpose was enacted, and it became operative in 1905. Since that date regular semi-annual examinations have been held in Trenton by examiners appointed by the State Board of Health to test the fitness of persons desiring to enter the employment of local boards of health, and thus far 304 applicants have been examined, and 148 licenses have been issued as follows: For health officers, 54; for sanitary inspectors of the first class, 65; for sanitary inspectors of the second class, 4; for sanitary inspectors of the third class, 2; for meat inspectors, 4; for plumbing inspectors, 19. This movement has perceptibly raised the standard of municipal sanitary employees in New Jersey, but inasmuch as preparation for the examination is worked out separately by each applicant for license, the degree of proficiency of the various licentiates varies greatly, and the necessity for systematic instruction has been found to be imperative. Insurmountable obstacles have, however, thus far been met in providing a suitable course of training, and until higher salaries and a fixed tenure of office shall be provided, there seems to be little ground for expectation that suitable persons will be willing to incur the expense and undergo the labor incident to attendance upon the lectures and demonstrations which are essential to the acquirement of familiarity with the principles and practice of the art of public hygiene.

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*See foot note, page 261, Revised Statutes of New Jersey.

In other States, notably in Pennsylvania and New York, offers of instruction in municipal sanitation have been made, but the movement has not yet been successful. In England the Sanitary Institute has for many years supplied instruction for sanitary officers and students, and diplomas in public health have been issued, after periods of post-graduate instruction, by at least fifteen universities and institutions of learning.

The medical inspection of pupils, teachers and janitors in public schools is a specialty which is best conducted under the supervision of the school authorities, for friction is liable to occur if the health department exercises authority over pupils and school employees during the school session and in school buildings, and as health boards have unlimited supervision over all persons who are affected with any communicable disease, and who are located in their own homes, it is undoubtedly advisable that school boards shall be held responsible for the care and safety of pupils while they are inmates of public school buildings. Moreover the compensation for medical inspection of pupils is properly paid from school funds, and furthermore regulations under which the work is conducted must be adjusted to produce a minimum of interference with the ordinary routine of instruction. The phrase "medical inspection of schools" appears to be misunderstood in some quarters, and it is sometimes construed to indicate that the inspection of public school buildings is a part of the duty of the physician who is appointed to the office of medical inspector of schools, but few, if any, of the medical men who are engaged in the detection of the onset or existence of infectious diseases, testing the vision and hearing of the children, and noting their physical condition and development, are qualified to correctly judge of the safety of the construction, ventilation, heating and drainage of buildings, and these questions should be dealt with by those departments of the local government which are especially constituted for that purpose.

All physicians do not realize that a medical training alone does not equip an individual to undertake the duties of the modern sanitary inspector, and as recently as the present year a member of the legislature of New Jersey (a physician) advocated an amendment to the sanitary licensing act of that State, the amendment being designed to exempt all physicians from the requirements of the prescribed examinations, and to permit all graduates in medicine to enter service as municipal sanitary inspectors and health officers without any preparation for the duties of these offices other than the study necessary to obtain a diploma in medicine. The amendment was defeated.

Finally, let me again draw attention to the great value of periodical conferences between executive sanitary officers, and to the influence which such conferences can exert in securing the adoption of tried and efficient sanitary measures; in obtaining uniform or similar action in adjoining districts and in securing popular approval and support. For even if the health officers in adjacent localities are equally industrious, zealous and well informed, very great differences will be observed in the degree of efficiency of the systems employed to attain the same ends, and frequent comparisons of procedures to determine which is most appropriate and effectual are therefore extremely desirable; and every municipality should extend to its citizens the benefits and advantages which result from the attendance of its chief health officer at gatherings of representatives of the health departments of other localities.

The proposed establishment of a new section in this Association, to be devoted to the study of subjects relating exclusively to questions concerning municipal sanitation, is an innovation which will doubtless be warmly welcomed by many who are seeking light, encouragement and inspiration.

THE RURAL HEALTH OFFICER

DR. CHARLES A. HODGETTS
Chief Health Officer of Ontario
Toronto, Ontario

The public expect too much of the medical man who is unfortunate enough to accept the position of Municipal Health Officer. They forget, or do not know, that public health is not all medicine, no more than it is the all of medicine.

The enforcement of the simplest health regulations brings him into conflict with some of the ratepayers to whom he looks for professional patronage.

As instances:

In the matter of the locating of a privy pit or closet upon a particular piece of property.

The deciding upon the manner in which some newly arrived Celestial shall dispose of his laundry slops upon premises which the owner, previous to his arrival in the community, has not been able to let for a pigsty, and in which only some itinerant beggar had found a temporary resting place, which premises, however, through love of gain minus consideration of public health, had to be let for human habitation.

The filthy slaughter-house and its accompaniment of raw offal and greedy hogs.

The piggery wherein city refuse was fed to swine, in turn converted into toothsome pork, etc., and sold in the city.

The retired farmer who carried into the village life the evils of farm life so that they become a nuisance to dwellers around.

The rendering plant to which the city sends its waste material and dead carcasses, but because of the nuisances arising therefrom will not permit of the business being carried on in the urban district.

These are instances which the mind will readily multiply as examples of the rural officer's difficulties. It must be remembered, too, that he has to consider and settle these often without fee, gain here or hope of reward in this world, nothing but the ill-will of some one or more of the ratepayers he serves free in his public capacity.

In the discharge of such duties he becomes a loser financially. That rural municipalities do not remunerate is a condition which prevails. I have frequent assurances and appeal is often made where a physician, acting in an emergency for the benefit of his municipality, adopts means to prevent the spread of some contagious disease, and, finding it almost next to an impossibility to confer with the members of the local board until the lapse of several days, takes matters into his own hands, finds after liabilities have been incurred that either through penuriousness on the part of the health representatives of the municipality or by reason of some legal technicality, he has made himself personally liable for these services rendered on behalf of the public.

Under such circumstances and in view of the fact that in most instances the early initiation of preventive measures means a municipal financial saving, and also prevents the loss of life, minimizes suffering, and curtails embarrassment to the business life of the community, is it to be wondered at that medical men either refuse to accept the very honorable position of Municipal Health Officer or hesitate in the prompt enforcement of the law?

The state or provincial law which does not clearly define that the Municipal Health Officer shall be paid certain minimum fees for services so rendered is certainly at fault, and the public have themselves to blame for this grievous oversight in the legislative oversight.

Even if provision is made, I am not certain but the general practitioner is not foolish in accepting the appointment, for certainly in my experience the acceptance of the office is suicidal to his best professional interests. Particularly is this the case when with the appointment, which in Ontario is by either by-law or resolution of the township, village of town council, his annual remuneration is set down at the miserable pittance of twenty-five dollars, or even less.

How often in a case of this kind has the well-meaning Municipal Health Officer found that long before the expiration of the twelve months he has brought down upon his well-meaning head the displeasure of council, local board and many of his former patients. He has brought no grist to his professional mill and received literally "the chaff" instead of the "flour" which means life to himself and family.

So frequently have instances of this kind occurred in Ontario in the some eight hundred municipalities that the opinion has been formed, and I have so advised medical men to refuse the appointment unless it is clearly defined either by by-law or resolution of the council the fees a medical man should receive for his official duties.

But the acceptance of this suggestion by medical men generally would mean a "strike," which would greatly embarrass public health work; this statement I accept, and would add the remedy is at hand, and in my opinion is one which would greatly enhance the importance of the office of Municipal Health Officer, and also result in a better enforcement of the laws. To be properly understood let me state that I am of the opinion the time has come in many of our more populous provinces and states for the creation of districts which would include a number of townships, villages and possibly a few towns, where the health laws should be administered by a Municipal Health Officer who is paid an adequate salary and furnished with a properly equipped laboratory to intelligently and properly carry on his work; such a Municipal Health Officer to devote the whole of his time to the duties of the office, and, so that his appointment may have a possibility of continuity, such an officer's appointment should be subject to approval of the central provincial or state authority, and dismissal should only be for cause.

The creation of such an office would not abolish the appointment of local township, village or town boards, or of local minor health officers, such as inspectors or sanitary police. Such boards and officers would be continued; their duties and functions would be greatly enhanced, and as a consequence health work generally placed upon such a working basis as is not the case under the conditions at present existing, and from the medical standpoint the minor frictions, which unfortunately exist, would be removed, for the District Municipal Health Officer would serve as an impartial administrator. He would be the health confidant of all doctors in the district, who would be in close touch with a health expert, one alike familiar with the medical aspect as well as other matters incident to public health, one who by reason of his not being in professional practice would be more likely to smooth difficulties, if not prevent many such as are frequently the case at present.

Many inestimable advantages, both to the medical profession and the public, will suggest themselves to the hygienist consequent upon the establishment of such a condition as briefly outlined in this paper, many of which are at present only to be found in the state or provincial office.

The proposed change is a radical one, but it is in the highest interests of the public and, notwithstanding the financial considerations incident thereto, will be adopted in general principle. Just in the same manner as the Municipal Health

Officer of a large city devotes his time to the duties of office, and with a well-equipped staff enforces health laws for the general good without fear or favor, so the District Medical Health Officer, with several local boards of health in each municipality therein, having its sanitary officials who would act within their own limits under his direction and supervision, would be able to administer wisely and well, promoting sanitation in all its branches where now it is imperfectly enforced or unobserved.

Laboratory Section

PROGRESS REPORT OF THE COMMITTEE ON STANDARD METHODS FOR THE BACTERIAL EXAMINATION OF WATER AND SEWAGE

Your Committee, in presenting its first report of progress, has found it impracticable to consider any positive changes in the present methods of examination, owing to the short time since its organization. It has been thought desirable, however, to suggest lines of experimental work to be carried on during the coming year which will tend to bring about such changes or modifications in the methods which were presented by the Committee on Standard Methods of Water Analysis in 1905.

As new methods and modifications are proposed and proven to be effective in the bacterial examination of water and sewage, material changes will of necessity be required, but no radical departure from the standards laid down should be made without thorough and exhaustive tests and due deliberation. The Committee suggests the following matter to be considered and if possible decided upon during the coming year.

QUANTITATIVE BACTERIAL TESTS.

In routine laboratory work the three media which should be used in standard quantitative tests on water and sewage aregelatin, agar and litmus lactose agar. One, two or all three of these media may be employed as the circumstances require.

GELATIN. No gelatin media should be employed having a melting point below 25 degrees C. The percentage of gelatin added may be increased to bring the melting point up to the desired figure. With most gelatin on the market eleven per cent seems to be preferable to the standard of ten per cent, providing the gelatin is weighed out without correcting for contained moisture, as appears to have been the custom. Recent unpublished work by a member of the Committee shows that ten per cent or even twenty per cent of moisture commonly occurs in laboratory gelatin, and that unless this is deducted in weighing, the stiffness of the media is materially affected and the bacterial results obtained considerably modified. It is suggested that 100 grams of gelatin per liter be employed and that all gelatin be tested for moisture before using by drying a sample for half an hour at 105 degrees C. The stock should be kept under uniform conditions in tight containers, so that the percentage of water present may then be properly accounted for and the weight on a dry basis be used in making up the medium.

Between steps 8 and 9, Standard Methods, page 108, the media should be titrated and adjusted to the final reaction of + 1.0 per cent.

Step 12, in place of "Adjust," read "If necessary, again adjust."

AGAR. Several experimenters have recommended 10 grams of agar per litre instead of 15 grams. The smaller amount seems to be sufficient to carry the added water and the medium is less stiff. This appears to give higher and more consistent counts. Between steps 8 and 9, Standard Methods, page 108, the media should be titrated and adjusted to the final reaction as in the case of gelatin, so that all cooking takes place under standard conditions. This appears to give more uniform results and a clear, bright appearing agar. Page 108, step 13, change "Boil two minutes" to "Boil five minutes."

It is well to determine the reaction of the media after sterilization, as during this process the reaction often changes and the final results should correspond to the acidity recommended by the standard methods. What has been said regarding the necessity of correcting for moisture in gelatin applies with equal force to agar and for the same reasons.

LITMUS LACTOSE AGAR. The azolitmin on the market varies considerably, much of that sold being entirely unreliable for the purpose. A one per cent solution of Kahlbaum's azolitmin, if boiled for five minutes, readily dissolves and needs no correction for acidity if added to standard agar. Many bacteriologists prefer pure litmus to azolitmin, and it is therefore suggested that its use be made optional. Both total and red colonies may be counted after from 18 to 24 hours when incubated at 40 degrees C. Such tests are particularly valuable in the control of filtration plants.

STERILIZATION. Sterilization in the autoclave seems to be preferable to that in flowing steam. Both in the lowering of the melting point of gelatin and in the breaking down of sugar media the time of sterilization has a greater effect than does the temperature within the standard limits. It is, therefore, suggested that small containers be used and that gelatin and all sugar media be sterilized in an autoclave at 120 degrees C. for 10 minutes and other media at 120 degrees C. for 15 minutes.

An important point in the sterilization of gelatin and sugar media is to have the sterilizer hot when the media is introduced, so that heating to the point of sterilization will be accomplished as quickly as possible. Also when sterilization is complete the media should be cooled rapidly. This not only reduces the time of heating, thus preserving the gelatin and the sugar, but also assists in the actual sterilization.

Standard Methods, page 14, par. 3, line 3: Change "115 degrees C." to "120 degrees C."

PLATING. Better and more consistent results appear to be obtained when 6 c.c. of agar or gelatin are used in the standard Petri dish, than when 10 c.c. are employed as recommended. The trouble from spreaders is lessened, smaller tubes may be used, thus economizing storage, and a considerable saving in the amount of media is also effected.

INCUBATION. With the lactose bile media the temperature of incubation seems to be best set at 37 degrees instead of the standard of 40 degrees set for agar and dextrose broth. The general use of a temperature of 40 degrees instead of 37 degrees is a matter which requires further study. On page 110 of the Standard Methods, 40 degrees C. should be used instead of 37 degrees in order to correspond with the temperature previously recommended on pages 84–92, inclusive.

PRESUMPTIVE TEST FOR *BACILLUS COLI*. It is now well understood that, to be of value, the test for *B. coli* must be quantitative or at least relative numerical values must be obtained. It is, therefore, essential to plant the fermentation tubes in varying amounts, using ten, one, and one-tenth c.c. for water, and smaller quantities for sewage and sewage effluents.

The dextrose broth solution now in use often gives positive results with gas formers other than *B. coli*. On the other hand, in impure waters and in sewage the results are often negative when they should be positive, due to overgrowth.

It is recommended that the lactose bile medium be employed as a standard for impure water and sewage work, and that the two fermentation media be optional in tests on waters of greater purity.

In the fermentation test with dextrose broth the absorption of carbonic acid gas is more comfortably made by a concentrated solution of sodium carbonate rather than by the sodium hydrate recommended. The results are precisely the same and the solution does not corrode the hands. Absorption tests are, however, unnecessary with lactose bile, and the majority of bacteriologists appear to have discontinued them even when employing dextrose broth.

The lactose bile medium consists of sterilized undiluted fresh ox gall (or an eleven per cent solution of dry fresh ox gall) to which has been added one per cent of peptone and one per cent of lactose. The addition of peptone is important.

SPECIAL TESTS FOR *B. COLI.*

The majority of our correspondents feel that the tests for morphology and motility can be well omitted, as only about one culture in a thousand which has passed the cultural and biochemical tests would fail on these tests.

When the culture has been isolated from a litmus lactose agar plate, the test for the coagulation of milk should be omitted, as actual records show that not one culture in the thousand isolated under these conditions fails to give the milk test.

About one out of every four non-typical cultures, which give a negative test for gas production, indol or nitrate reaction, will show a positive test if repeated on the same culture. For this reason all non-characteristic tests on these media should be repeated before reporting.

There appears to be an error in stating the proportion of peptone to potassium nitrate in the nitrate broth. The usual proportions are 0.1 per cent of peptone and 0.02 per cent of potassium nitrate, the latter being stated as two grams per liter, or ten times the usual amount.

PRELIMINARY CULTIVATION.

The period of preliminary cultivation should in each transplantation be shortened to 24 hours in order that the culture may attain its greatest degree of vitality.

PUTRESCIBILITY TEST.

Experiments recently performed using methylene blue, methylene green and indigo carmine on sewages, effluents and mud deposits from water and sewage seem to show that the use of the double zinc salt of methylene green at a temperature of 37 degrees gives the quickest and most satisfactory results. The bottles used are 250 c.c. in capacity, ground for glass stoppers, but used with rubber stoppers. Through the perforation of these stoppers is a glass tube having a 5 c.c. heavy rubber bulb on the end. After the bottle is filled and the stopper placed in position, the bulb and the tube are also filled and the excess of water is pressed out below the rubber bulb, leaving it in a collapsed condition. A provision is thereby made for expansion when the liquid is heated to 37 degrees C. in the incubator.

DESCRIPTION OF SPECIES.

Several of the Committee have suggested the adoption of the numerical method of describing species recommended by the Society of American Bacteriologists, and a study of this method will be undertaken during the coming year.

The descriptions, and even the names, of many common species of bacteria are badly confused. Much comparative study in different laboratories must be made in order to at least partially systematize the descriptions of the characteristics of these species and to assign to them the names originally given them.

Respectfully submitted,
DANIEL D. JACKSON,
Chairman.

PROGRESS REPORT OF THE COMMITTEE ON STANDARD METHODS OF CHEMICAL ANALYSIS OF WATER AND SEWAGE

The Committee on Standard Methods of Chemical Analysis of Water and Sewage submits the following report of its work:

It was the consensus of opinion at the Atlantic City meeting last year, that a new edition of the present Standard Methods report should be issued in the near future and that preparations for that work should be begun at once. Accordingly your Committee has begun the work of collecting information and data looking toward such a revision during the coming year. In order that the work might be undertaken with a full knowledge of existing conditions the following information was desired:

To what extent are the present standard methods employed in the water laboratories of the country?

In the case of those determinations for which standard methods have been described, to what extent are other methods or modifications employed, and for what reason are they employed in preference to the standard methods?

What determinations, if any, are in general use in water laboratories for which no standard methods of procedure have been described?

A circular letter asking for the above information, for any additional information which would assist the Committee and for offers of assistance in trying out new methods was mailed to all members of the section having any connection with water work.

The replies have been general and encouraging. The present standard methods for chemical analysis are in general use, at least among those laboratories represented in this section. As a general rule the methods are followed as laid down or with occasional minor and non-essential modifications. Where serious departures from the standard methods are reported they are as a rule attributed to a disinclination to change from methods which have been employed for some time in the past and upon which permanent and continuous records have been founded. A few alternative methods have been recommended as improvements in the existing methods. These will be summarized later.

By far the largest number of suggestions are in the line of additional methods. There is an urgent demand from many sources for a set of methods for the complete mineral analysis of water. Methods are also desired for the analysis of commercial alum, copperas, lime, soda ash and other materials used in the treatment of water.

Offers of coöperation have been freely made and will be availed of during the coming year in the comparative tests which are proposed.

It is the opinion of the Committee that the following points should be specially considered in the preparation of the final report.

A satisfactory index.
Methods for complete mineral analysis.
Rapid methods of analysis for filter control and field methods.
Methods for the analysis of commercial materials used in water and sewage treatment.
Fuller treatment of the subject of indicators, especially in connection with CO^2 and iron and aluminum work.
Interpretation of results.

The Committee is now prepared to proceed with its program as follows:

All proposed changes which appear to possess any merit whatever will be outlined in this report. It will not be possible to give new methods in detail but sufficient indication of the character of the method will be given. Recommendations which may come into the hands of the Committee during the remainder of the year will also receive attention. It is proposed to institute a careful comparative test of all points at issue, whether they be matters of minor detail or totally different methods. Advantage will be taken of the many offers of assistance already received and the Committee will welcome others. Members are asked to specify what kind of work, if any, they prefer. In this manner it is hoped to obtain the most reliable information possible as to the relative merits of the various alternative methods available. This arrangement also has the advantage of leaving the final decision as to what form the standard methods shall take in the hands of those water chemists who are most interested in each branch of the work and best qualified to select the most advantageous procedure.

Suggestions which have been made in relation to changes in the present methods and addition of new material are as follows:

CHANGES SUGGESTED.

TURBIDITY:

Silica standards as now prepared require considerable skill, time and patience in their preparation. Levy has recommended the use of precipitated Fuller's earth as a satisfactory substitute.

In sewage. Recalibration of the standard candle turbidimeter for coarse material such as is met with in sewage work.

Suspended solids. Point of distinction from colloidal matter and questions of how this is altered by use of papers of various grades, asbestos mat or Berkfeldt filter.

Free Ammonia:

The method of direct reading has been improved and is in quite general use in sewage work. Comparisons will be made with a view to establishing this method on a better footing.

Permanent standards employing potassium bichromate in place of platinic chloride have been successfully used.

Organic Nitrogen:

The present method of distilling off the free ammonia and determining the nitrogen on the residue is not compatible with the method of direct reading of free ammonia. A certain amount of nitrogen would escape detection by either process. It is not so essential to draw a hard and fast line between free ammonia and organic nitrogen as it is to use a combination of methods for these two determinations which will include all the nitrogen without overlapping.

Two alternatives are possible.

Determine the free ammonia by distillation and the organic nitrogen on a sample similarly distilled or preferably upon the residue from the free ammonia distillation.

Determine the free ammonia by direct reading and the sum of the free plus organic by the Kjeldahl; organic by difference.

The question of the direct reading of the Kjeldahl digestates will be considered.

Nitrates:

The present methods are not satisfactory in sewage work. Two new methods are available for study and comparison. One is the Brucine method of Noll (Ziet f. ang. Chem. 1901, XIV, 1317) as modified at the Sewage Experiment Station of the Institute of Technology. The other is a similar method as yet unpublished, submitted by McRae of the Baltimore Sewage Testing Station. This method employs the alkaloid narcotine and is very delicate.

Dissolved oxygen: A colorimetric method has been proposed by Pratt and Stabler.

COPPER:

The present method for the determination of copper alone in water is long and difficult. An electrolytic method has been described which is submitted for comparison. (Phelps, Jour. Amer. Chem. Soc., XXVIII, 1906, 368.)

HARDNESS:

The necessity for the use of calcite is questioned as being too great a refinement for a comparatively unsatisfactory method. The use of pure sodium oleate in making up the soap solution is a possible improvement which will be investigated.

Incrustants: The present method is not accurate. A determination of Mg. and Ca. is recommended.

Free lime: The silver nitrate test is in wide use. It requires further study and standardization.

ADDITIONAL MATTER.

The subject of the mineral analysis of water will be gone into fully and all the present methods will be the subject of careful study. It is hoped to make use of the methods of limestone analysis adopted by the American Chemical Society as far as possible. This will be the most difficult part of the work and the Committee will welcome offers of assistance in this line.

MANGANESE:

A method published by Weston and an unpublished method submitted by G. H. Pratt are available for comparison.

HYDROGEN SULPHIDE:

This is an important determination in sewage work which should be added.

FREE CHLORINE:

An unpublished method for the estimation of small quantities of free (available) chlorine is at hand and will be of value in connection with work on the disinfection of water and sewage. It depends upon the oxidation of o-tolidin.

ALUM:

A method for the analysis of crude alum is submitted. Other methods are available, and methods for the analysis of other crude materials used in water and sewage treatment will be obtained. Standard specifications for these materials are needed, and these must be preceded by standard methods of analysis.

SEWAGE SLUDGE:

Special methods of analysis are required.

WATER:

Rapid approximate methods for filter control.
Methods available for field assay.

PUTRESCIBILITY IN SEWAGE WORK:

This is one of the most important items in the present scheme of analysis for sewage effluents. A standard method of procedure is urgently needed. The methylene blue test has given general satisfaction wherever used, and is recommended for detailed study as the most promising of the putrescibility tests.

EARLE B. PHELPS,
Chairman.

COMMITTEE ON BACTERIAL MILK ANALYSIS

REPORT OF PROGRESS

Abstract.

The Committe on Bacterial Milk Analysis respectfully submits the following report relating to research work on the various problems concerning which no procedures were recommended in the preliminary communication:

It is realized that methods of analysis must always be subject to change and improvement, and since some of the questions involved were of such a nature as to require an immense amount of research, the Committee deems it wisest at this time to report in some detail the work done during the present year, without making final recommendations.

As a Committee we reiterate such recommendations of our preliminary communication as are unaffected by this report, and request that they be adopted by laboratories doing milk work, thus developing so far as possible uniformity of technique and of interpretation.

We wish to express our thanks to those who have assisted in this work and to voice the hope that the spirit of coöperation they have shown may prove contagious among all laboratory workers.

Media. The Committee still recommends for routine work 1 per cent agar reaction +1.5, made otherwise according to the recommendations of the water committee.

The work done on media during the year is summarized as follows:

1. Determination of degree of acidity in media best for the highest bacterial count in milk.[A]

Two hundred forty tests or 960 plates were made comparing agar media made with +.5, +1.0, +1.5 and +2.0 degrees acidity.

Media with reaction of +1.5 showed consistently the best results.

2. Determination of per cent of lactose in media best for the highest bacterial count in milk.[A]

Ordinary agar media was used containing 0, 1, 2, 3 and 4 per cent of lactose respectively.

Two hundred seventy tests or 1,300 plates.

It seems fair to conclude from these tests that for work at 37° C. agar with no lactose is better suited to the growth of milk bacteria than agar with lactose. At 21° C. 1 per cent lactose gave better results.

3. Determination of peptone in media best for the highest bacterial count in milk.[A]

Ninety tests or 270 plates indicated the superiority of 3 per cent peptone, but work now being done in duplication of these tests does not give parallel results.

4. The comparative efficiency of whey, ordinary and 4 per cent lactose agar for highest counts of milk bacteria, lactic organisms.[A]

Sixty-nine tests or 207 plates. Seventy-four of these plates are given first place as 5 had equally high counts. Of these 74 ordinary agar had 28, whey agar 24 and lactose agar 22.

Of associative organisms, not lactic, we have 18 tests or 54 plates in which lactose stands first 8 times, ordinary agar 6 and whey agar 3.

5. Whey agar compared with ordinary agar.[A]

Of 109 tests made with lactic microörganisms 77 or 70.64 per cent grew best on whey agar.

Of 105 tests with milk organisms other than lactic 63 or 60 per cent grew best on ordinary agar.

Of 48 "composite" tests 42 or 87½ per cent grew best on ordinary agar.

Of 23 germs other than lactic isolated from milk all but 6 or 73.9 per cent favor ordinary agar.

The conclusion is drawn that whey agar favors the growth of lactic organisms, and ordinary agar the growth of organisms other than lactic found in milk, and that for the determination of the number of bacteria in milk ordinary agar would be most useful.

6. Dextrose litmus agar compared with lactose litmus agar.[B]

One hundred six tests at 20° C. and 104 at 37° C.

Dextrose showed a higher count of red colonies at both 20° and 37° C.

Lactose showed a slightly higher count of blue colonies at both 20° and 37° C.

Dextrose stands a little higher on the total count at both 20° and 37° C.

With the 37° C. incubation lactose stands best at 24 hours, and dextrose better at 48 and 72 hours.

As far as the total counts are concerned there seems to be little choice, the advantage of dextrose being in the higher count of the acid colonies.

7. Comparison of litmus lactose agar at 37° C. and litmus lactose gelatin at 20° C.[C]

Of 25 tests gelatin gave the highest count in 18; agar in 7. Where gelatin shows the higher count the percentage of difference is much greater than where agar showed the higher number. The differentiation of species or types seems much better in gelatin, but there is a considerable loss of plates from liquefiers.

Comparison of above both grown at 20° C.,[C] 24 tests, gelatin stands first in 14 and agar in 10.

A comparison of these two series of tests would seem to indicate that the temperature of incubation has more effect on the number of colonies than the medium used.

8. Comparison of beef peptone gelatin plates at 20° C. to 22° C. for 72 hours with beef peptone agar plates at 37° C. for 24 hours.[D]

In this series of 24 comparisons gelatin stood first in 18, agar in 4, equal results were obtained once, and in one the gelatin liquefied. The total gelatin count was over double that on agar.

The higher counts on gelatin must be largely attributed, (1) to the method and time of incubation; (2) the larger growth of the colonies of the lactic acid bacilli.

INCUBATION. The work done by various persons on media included in most instances research on incubation also, most of these tests being made in comparison of 20° C. and 37° C. for varying period of time; 591 tests, 3,349 plates. (One worker[E] submitting incubation comparison only.)

Summarizing the work on incubation we may say that the weight of evidence is against 24 hours' incubation at 37° C., and two days' incubation at or around 21° C., the number of colonies obtained being too small for a fair idea of the number of bacteria in the sample.

Eight-day and ten-day incubations at 21° C., while giving a slightly higher average count, have disadvantages, such as delay in reports, accumulation of plates and drying out of media, which render them undesirable for routine work.

The lines of highest efficiency on a working basis would seem to rest on a 48-hour incubation at 37° C. and a five-day incubation at 21° C.

It would seem advisable to recognize as standard both of these methods of incubation (it being understood that carefully regulated incubators should be used).

Board of health regulations governing the number of bacteria allowable in milk should state the method of incution to be used in examination, and in all reports, papers, etc., on the bacterial count of milk this factor should be explicitly stated.

COMPARISON OF ORDINARY AGAR PLATES, INVERTED AND PLACED UNDER A BELL JAR; AGAR PLATES WITH GLYCERINE AND AGAR PLATES WITH EARTHENWARE TOPS.[D]

Method. Beef peptone agar of the same make was used in the following tests. All plates were incubated in an insulated chamber in which a three-gallon pail, filled to the top with water, was kept. One set of plates was placed upside down under a small bell jar in the incubator. A second set of plates was inverted, and a strip of blotting paper, upon which a large drop of glycerine was placed, was laid in the lid of each Petri dish and placed in the incubator. The third set of plates was covered with Hill's earthenware tops and then incubated. Following the advice of Hill, thesetops were never washed, but always sterilized before use. The results of these experiments seem to indicate that the agar plates with glycerine prepared in the above manner are slightly more reliable than the earthenware tops.

The principal objections to the latter are:

(1.) They scratch the glassware.

(2.) The plate has to be uncovered for examination.

(3.) They are more liable to dry out if kept longer than 36 hours.

The Microscopic Estimate of Bacteria in Milk.

Several laboratories are now making this examination as a routine procedure. One worker,[F] who has done considerable experimentation along this line during the past year, sums up his results in attempts to actually approximate plate counts as follows:

"The method seems to be fairly satisfactory for milks, the bacterial content of which is not too low or too high; when the numbers are down below ten thousand the method seems to be quite inaccurate, and when the numbers run up into the millions I find also the numbers are not very reliable. Within the limits of from thirty thousand to three hundred thousand, however, the method seems to be fairly good. My general feeling is that a direct microscopic method might give an idea as to whether the sample is very good or very bad, but would not replace the plate method of examination in determining actual numbers and would be of no use for the examination of samples of milk, whose number of bacteria is quite low."

Another,[G] who has done much work with this method, finds it chiefly useful as a preliminary test, not plating samples which are shown by the microscope to contain less bacteria than the city regulation permits; in those samples which are plated it serves as a guide for the proper dilutions. He finds it possible with this examination to correctly state in nearly every instance when a milk contains less than 50,000 bacteria to a cubic centimeter or when it contains over a million bacteria to the c.c. On actual estimates within 50,000 of the plate count his average on counts is 66 per cent correct on counts between 50,000 and 500,000, and 50 per cent correct on counts between 500,000 and 1,000,000.

Examination of Milk for B. Coli has become a routine procedure in some laboratories, the number of *B. coli* present seeming to some degree a more exact index as to the care of the production than the total bacterial count. In Baltimore[H] routine examinations are made for *B. coli* in milk in one one-thousandth c.c. of each sample.

One c.c. of the one one-thousandth dilution is placed in ordinary ox bile containing 1 per cent lactose in a fermentation tube and allowed to stand at 37° C. for 72 hours, at the end of which time, if there is more than 15 per cent, gas plates are made, colonies isolated and run through species tests. Of many hundred examinations the colon bacillus is found in about 25 per cent of the samples in winter and 75 per cent in summer in one one-thousandth of a c.c.

A new fermentation tube has been devised by Dr. T. M. Wright, using an ordinary U tube with a rubber stopper for the closed end. The advantages claimed are, (1) cheapness; (2) ease of cleaning; (3) breakage reduced to a minimum; (4) they occupy less incubator space, especially when proper racks are provided.

Æsculin bile salt media has been recommended[D] as a presumptive test for the detection of *B. coli* in milk. The preparation of æsculin is said to be easy, and different lots are very uniform in composition.

The method is given as follows: Weigh out

1 or 2% of Witte's peptone.
.5% sodium tamocholate (commercial).
.1% æsculin.
.05% iron citrate (ferric).
100 c.c. tap water

After steaming 15 to 30 minutes the medium is filtered, filled into fermentation tubes and sterilized.

For æsculin agar 1.5% agar is used, being dissolved in part of the water, after which the other ingredients are added, the medium brought to a boil, filtered, tubed and sterilized.

Colonies of *B. coli* in media containing æsculin are black with a black halo, and can be readily counted against a white background.

Some other organisms give the reaction, notably *B. lactis aerogenes;* both may be counted on the plates, and on account of the different character of their colonies separate counts may be made of each.

Comparison of fermentation tests of milk with the addition of carbolic acid, and milk with the addition of bile salt and neutral red.[D]

Method. Ten c.c. of the samples of milk was pipetted into each of three sterilized tubes. To one tube .3 c.c. of a 5 per cent solution of carbolic acid was added; to the second tube 1 c.c. of a sterilized 2 per cent solution of bile salt containing neutral red in sufficient quantity to give the milk a deep pink color; and the third tube was kept as a control. All tubes were incubated at 37° C., and the results recorded at the end of twenty-four hours.

Without recording the results in detail we may briefly state that the tubes containing the carbolic acid and neutral red bile salt gave the most striking results for gas producing bacteria, as the chemicals used evidently inhibited the growth of the lactic acid bacteria more than the gas producing bacteria. The best results were furnished by the neutral red bile salt. Gas production was clearly demonstrated, and if the bacteria producing gas were in large numbers, the deep pink of the milk was changed to canary yellow.

Comparison of æsculin bile salt agar and neutral red bile salt for quantitative and qualitative examination of the coli and aerogenes groups.[D]

Method. The medium neutral red was made up according to the directions of Grünbaum and Hume; the æsculin agar, according to the recipe given by Harrison and Van der Leck.

In nearly every instance there were more bacteria of the coli group counted on the neutral red bile salt agar plates, due to the *great difficulty* in deciding which were coli-like colonies. Over fifty coli-like colonies were subcultured for complete identification, with the result that only 67 per cent were found to be *B. coli* or *B. aerogenes*. On the other hand, although we have subcultured for complete identification over a hundred colonies from the æsculin bile salt agar plates, we have found only *B. coli* or *B. aerogenes*.

In consequence of these results we should suggest that the æsculin bile salt method be given a trial by all workers who make many routine milk or water analyses.

Wisconsin Curd Test.[1] "Work done with this test for detection of fecal matter shows that positive results can be obtained from other gas formers than *B. coli*.

"The advantage of the test is that it is simple to perform in the dairies and very quick in its results, determination being made over night. The disadvantage is that while it is a valuable indication it is by no means a sure test for the presence of fecal matter."

TUBERCLE BACILLI IN MILK.[J] Collection of samples and technique.

(The Committee refers to the technique recommended by Anderson of the Hygienic Laboratory, Washington.)

LEUCOCYTES.[K] The value of a leucocyte count in determining the sanitary quality of milk.

Daily morning and evening leucocyte counts are being made (Doane-Buckley method) on the milk of two normal cows during the whole period of lactation, the work having been carried on for several months but not yet finished. The animals have been kept under exactly similar conditions and on regular feed; they have been carefully watched and subject to frequent inspection by a competent veterinary surgeon, and during the entire period, to date, have been in perfect health. Remarkable variations in the leucocyte count from milking to milking have been found without demonstrable cause.

A new sedimenting tube has been devised by Stone & Sprague, for which they claim the following advantages over the ordinary tube:

1. It measures more accurately the sediment.
2. Smears of the sediment can be made in the same manner as with the Stewart tube.
3. The column of sediment tends to become stratified, so that different elements can be easily made out.
4. The tubes are much more easily cleaned out. With these tubes they have been able to detect cases of acute mastitis when the milk was diluted thirty times with ordinary milk, a mastitis sediment practically always showing a yellowish or pinkish tinge of pus mixed with a smaller or larger amount of blood. They recommend supplementing such tests with examination of the herds.

Artificial Production of Leucocytes in the Cow's Udder.[1] Up-to-date work along this line has been confined to a study of the effects which result from the injection of varying amounts of sterile solutions into the different quarters of the udder. Thus far distilled water, a two per cent aqueous solution of boric acid and a physiological salt solution have been used; experiments have also been made with the injection of cultures of certain pyogenic organisms.

In all cases a marked leucocytosis resulted; in some instances the leucocyte count being increased to twenty-five million cells per c.c. of milk. Also invariably fibrin was found, especially when the garget was at its height. Beside leucocyte determinations, quantitative bacterial determinations were also made. These revealed a rather interesting phenomenon, for as the leucocyte content increased the bacterial content seemed to diminish, presumably due to an increased phagocytosis.

Acid determinations upon the milk from the injected and uninjected quarters indicated that with the higher leucocyte content a lower percentage of acidity is obtained. This, no doubt is due primarily to the increased diffusion of the slightly alkaline blood serum into the milk.

The acid determinations were usually made within an hour after withdrawal of the milk, so that the acidity could not be attributed to bacterial activity.

Apparent Increase in Number of Leucocytes in Pasteurized Milk.[M] As previously shown[L] the heating of milk gives a much higher count with the Doane-Buckley method than is obtained with the same sample unheated.

A large number of tests made on milk before and after *pasteurization*, using the smeared sediment method, shows a very noticeable increase in the leucocyte count obtained from the pasteurized milk. Often milks which before pasteurization passed as normal showed great increase in the number of leucocytes sedimented after pasteurization.

It is the opinion of the Committee that milk having high leucocyte content, unless accompanied by other indications of inflammation, such as blood or virulent organisms, should not be condemned as unfit for use on the laboratory findings alone. Such milk may be regarded with suspicion and the laboratory findings may well serve as a guide for veterinary inspection.

F. H. SLACK, *Chairman.*
W. H. PARK.
B. H. STONE.
F. C. HARRISON.
C. E. MARSHALL.
H. L. RUSSELL.

[A] C. E. Marshall, with Miss Northrup and Miss Farrand.
[B] P. G. Heinemann.
[C] W. A. Stocking.
[D] F. C. Harrison, with J. Van der Leck.
[E] C. E. North.
[F] H. W. Conn.
[G] W. M. Campbell.
[H] W. R. Stokes and T. M. Wright.
[I] D. D. Jackson.
[J] J. F. Anderson.
[K] B. H. Stone and L. P. Sprague.
[L] H. L. Russell and C. Hoffman.
[M] B. R. Rickards and W. M. Campbell.

Vital Statistics Section

NOTE.

Copy from Vital Statistics Section not received in time for publication in this issue. — EDITOR.

THE MASSACHUSETTS ASSOCIATION OF BOARDS OF HEALTH

OCTOBER QUARTERLY MEETING

Boston, Mass.

The quarterly meeting of the Massachusetts Association of Boards of Health was held at the Brunswick Hotel, Boylston Street, Boston, on Thursday, Oct. 29, 1908, Vice-President Durgin presiding.

The following were elected to membership:

E. H. Trowbridge, M.D., of Worcester.

J. J. Carroll, M.D., of Holyoke.

Evangeline Wilson Young, M.D., Chairman Committee of Public Health of the Woman's State Medical Society of Massachusetts.

Louis H. Richardson, of New Bedford.

Edgar H. Guild, M.D., bacteriologist, of Springfield.

REPORT OF THE COMMITTEE ON THE FLY NUISANCE. The Committee has held two meetings at which the phases of the subject were considered, one on September 24 and the other on October 26. It presents the following suggestions for a form of circular to be circulated among boards of health, and accompanies the same by this preamble:

The information that is available with reference to the exact breeding places and habits is comparatively scanty. There are many entomologists who would gladly make observations if their attention were called to the need of such facts as they can secure. Boards of health will confer a service on the public and will further such efforts as this by making known to students the need of this kind of information.

The question of the distribution of flies is little understood. A few investigations only have been made, yet by setting fly-traps and other simple observations much valuable information may be secured.

The mosquito has been closely studied and remarkable results have been obtained.

The Committee believes in making it known that the scarcity of flies in a given place is a good measure of the cleanliness of that place.

Closely allied to the main question is that of foods exposed for sale. The Committee believes that the time is ripe when such questions as the screening of fruit and foods to be consumed raw may be discussed. The Committee believes that such articles should be protected from the dust of the street and from flies. Candy and fruit bought at the stand on the corner of the street will insure to the consumer his full peck of dirt.

Another matter to which the Committee gave much attention is the proper care of the compost heap and the privy. With reference to the former, more attention on the part of the boards of health to the condition of barns and barnyards would result in a betterment of the conditions. With reference to privies, it is possible to improve the conditions in the outer districts of cities by insisting that connections be made with the sewer when there is a sewer in the street. When there is no sewer, the board of health should see that the privy vault is made fly-proof.

One of the matters related closely to the fly question is the regular and frequent collection of garbage. The present methods show that reform is needed. Garbage ought to be collected daily in hot weather in cities. Dumps have usually garbage in them and may be good places for the flies to breed. They should be inspected strictly.

The Committee recommends the following circular for the discussion of the Association.

(Signed) C. V. CHAPIN, Providence, R.I.,
Chairman.

BEWARE OF FLIES

Flies are filthy insects. They drink from the cesspools, and dine in the privy vaults. They eat the sputum on the sidewalk, and revel in the garbage pail. They swarm on the baby's diaper, and are greedy for the dressings from a discharging wound.

Perhaps you think it is disgusting to read about such things, and so it is. But is it not more disgusting to have these same flies, after their repast of filth, drown in the milk pitcher, drop their specks on the frosted cake, or clean their feet on the bread? Is it pleasant to see the flies that very likely have just come from a neighboring privy crawl over the lips of the sleeping baby, or gather on the nipple of its nursing bottle? Suppose the fly that was fished out of the milk pitcher had just been eating the excrement of a typhoid-fever patient, would you like to drink the milk? Perhaps the flies that were walking on the fruit which you purchased at the street corner had just been feeding on the sputum of a consumptive. Does it not seem likely that flies may spread disease? That is what many physicians and health officers think.

Perhaps hereafter you will screen the house, and protect the food from flies.

The young of flies are maggots. They seem to prefer to breed in stable manure. But they also breed in excrement of all kinds, in garbage, and in all sorts of wet and filthy refuse.

Do you want to raise these filthy insects, these germ carriers, these indicators of untidiness, to be a pest in your own house, and perhaps carry disease to your neighbors? Of course you do not.

Then keep the stable manure closely covered and have it removed often, once a week in summer if possible. Keep the back yard and the alley clean. Allow no refuse to accumulate anywhere. Connect with the sewer if there is one in the street. Fix the privy so it will be fly-proof. After your own premises are in order, talk over the matter with your neighbors, and get them also to read this circular.

DISCUSSION

MR. RITCHIE. There has come to my ears more or less criticism that this circular is not the kind of circular that one would like to print in his daily paper, but the fact is that here are things that should be made known to the public. This circular was the one which in the opinion of our Committee would express certain ideas, put in a form which would attract attention, which would strike the facts home to the individuals, to the members of the boards of health, to the persons to whom the circular might be sent. If the circular is worth having it is worth distributing, and I should be glad to see some action taken whereby if it is worth distributing it may be distributed; and if it is not worth distributing, that the subject matter or the principles of the matter may be so arranged that they can come to the public.

Our Committee, in considering the matter as fully as it could in the time available, has concluded that disease has not yet been fastened sufficiently closely to the fly to make that a watchword in the campaign.

DR. BROUGH. Mr. President, I notice that in the circular they do not mention any method by which we can dispose of the flies. They recommend screening excreta, but is there any special way they recommend in regard to killing them?

MR. RITCHIE. The fly warfare of the future is not to be conducted with sticky fly paper or the fly broom, it is to be conducted by sanitarians on a larger scale at the places where the flies breed. The flies breed in filth. The warfare that is to be carried on at the places where the flies breed is the campaign for cleanliness. It is a warfare similar to the warfare against mosquitoes, a warfare on their breeding places, and if we take it as our watchword that the measure of the cleanliness of a place is its lack of flies we have a watchword upon which we ought to be able as sanitarians to fight.

DR. WHEATLEY. I would like to inquire through you, Mr. President, of the Committee, whether they have ascertained the migratory habits of flies, how large a zone, how large an area of territory flies cover.

MR. RITCHIE. This is one of a great many unanswered questions regarding the fly.

VICE-PRESIDENT DURGIN. When it was proposed that this Committee be appointed it was with a view of unifying thought upon the best methods of preventing the breeding of the fly. It was hoped that such a report would be made as would appeal to the Association and arouse a sense of the importance of earnest, universal action against the fly as a public nuisance. I will call on Dr. Chapin to close the discussion, after which it would be well to consider the question of continuing the Committee.

DR. STEVENS. Before Dr. Chapin speaks I would like to say a word in regard to the question. If this Association approves of this circular and adopts it, and recommends it being published in the papers, the local papers of the small towns and the large towns, it will reach more people than all the circulars you can send out. It is a well-known fact that the community have great faith in what they read in the newspapers, especially anything that relates to their health. If the papers publish this sort of thing everybody will see it and everybody will believe in it. It will have more effect than anything else you can do.

DR. CHAPIN. The Committee are not able to answer the question that Dr. Wheatley asked, and we were not able to answer very many questions which were asked by ourselves. It seems to me that this is a fine opportunity for the boards of health to do good work. Let them study during the coming summer the distribution of flies — the seasonal distribution of flies, the local distribution in the town or city, and their breeding places. You all know the very valuable work that Professor Underwood has done in studying the distribution and growth of the mosquito. Cannot we have work on flies in emulation of his? In regard to this circular we give it to you as a suggestion, and we expect that you will indicate points in which it may be improved. It was not given out as a model, but simply as a suggestive circular.

VICE-PRESIDENT DURGIN. The Chair would for one be very unwilling to see this subject dropped. We have had nothing more important before us for years, and it is worthy of our very earnest, continued attention. The Chair would suggest that some expression of the Association as to the continuance of the Committee, and any addition to its membership would be in order.

As a result of various motions and amendments the Association approved the report of progress and continued the Committee, instructing them to distribute the circular at such time as may seem best to them to the press and to local boards of health throughout the Commonwealth. The Committee was also requested to include the circulars on sex hygiene when mailing. Mr. Underwood was added to the Committee.

REPORT OF COMMITTEE ON MILK LEGISLATION.

The Committee appointed to ascertain the sentiment of the boards of health of the various cities and towns throughout the State in the matter of bringing the appointment and direction of the work of milk inspectors under the jurisdiction of local boards of health at our first meeting decided to send out a circular letter to the various places, together with a list of questions to be answered and returned. Up to the present time we have received replies from fifty-seven places.

To the question asking for an expression of opinion as to the desirability of the proposed change, fifty-one of the fifty-seven answered favorably. Following are some of the replies to this question given verbatim:

"It is as important and applicable to boards of health as any other public health work now performed by them. It properly belongs with the boards of health."

"Unanimously in favor of such change."

"Very desirable and believe very important that change be made."

"In our opinion such change would result in much good."

"Highly desirable."

"Very essential."

"Good thing."

"Unquestionably, the appointment should be made by local boards of health, and the inspection and supervision of market milk should be in their control, and the licensing of milk dealers."

"Boards of health should have absolute control."

"The board of health earnestly desires such change as we feel it would place the matter where it rightfully belongs."

"It would be the right thing, thereby giving the board of health the control as well as responsibility for pure milk supply."

"We feel that it would be of great help and a benefit to us."

"It is the only proper way."

"It would be eminently proper."

To the question, "Will your board coöperate in the attempt to secure legislation to this effect at the next General Court?" fifty-one replied promising assistance, four were noncommital, and two answered no. Of the two last, one was favorably impressed with the desirability of the change, but for some unstated reason couldn't promise any help. The other replied asking whether "any legislation is necessary in view of Chapter LVI of the Revised Laws, Section 51 of which seems to give the necessary authority." As neither the section nor chapter referred to mentions local boards of health in any way, the Committee feels that in this particular case our correspondent erred in his interpretation of the statutes.

It was found that four cities have already secured special legislation transferring all matters pertaining to milk inspection to the local board of health. All four stated that the change had resulted in increased efficiency.

One city has in its new city charter granted the power of appointment of milk inspector to its board of health, which reports largely increased efficiency in the work as a result.

Three other cities have special ordinances giving the boards of health direction of the work of milk inspectors and report that the change has resulted in increased efficiency.

In one town the board of health appoints the inspector and directs his work. In one other town he is appointed by the selectmen and board of health jointly. In three other towns the inspector is appointed by the selectmen, but by special arrangement the direction of his work is given over to the board of health.

Two cities report unsuccessful attempts to secure legislation transferring the milk inspector to the board of health.

It is the desire of your Committee to have passed at the next session of the General Court an act amending Section 51 of Chapter LVI of the Revised Laws so as to transfer the appointment of milk inspectors from the mayors and selectmen to the boards of health of the respective cities and towns, excepting such as have already secured like legislation. The Committee is aware that strong opposition may appear from certain places and is at the present time unable to decide whether to try to overcome such opposition or to eliminate it by excepting the places from which it emanates from the provisions of the proposed act. We can, however, by using the influence of all who have signified their intention of assisting, make an effort to have the act apply to as many places as possible, leaving the others to come in whenever the opposition has diminished sufficiently.

The Committee would like to have the indorsement of the Association of the proposed legislation, as we believe that such an expression would be of considerable assistance.

G. E. BOLLING,
Chairman.

DISCUSSION

DR. RUSSELL. A case in which I was interested was brought before a judge of the Supreme Court of the State, and he decided that a milk inspector was simply a clerical officer; he had no judicial functions whatever; all the rights he had in the matter were simply when a man applied for a license to grant him one, although he might know that the man was absolutely unworthy and was producing at that very time impure milk and selling it. If a board of health was constituted of men interested in scientific questions and interested in health they would appoint a good milk inspector. Unfortunately, if they were not, they might appoint the other one. I am most heartily in favor of the boards of health appointing the inspectors, having had experience on both sides of the question.

DR. HOLDEN. The inspector of milk is not altogether a licensing power, but he acts in a clerical capacity, and he must license every person that applies, regardless of whether he is a fit person to handle milk, and regardless of whether the premises are in a sanitary condition or not. That is the law as it stands today in the opinion of the city solicitor of the city I represent. It is a very important matter and a very vital matter that that should be changed.

MR. GEO. WHITING. It seems to me the milk inspector has a great deal of authority and that he fills a very important office, and there is no more power vested in him than there should be. We are bound to respect his authority, and I must say he has spurred us on to a greater activity in looking after our dairies and our general milk supply. It seems to me the local boards of health are more competent to decide upon the men to act as milk inspectors than any other body or individual. They are certainly in closer touch with the subject than anybody else. I should suppose it would be the sense of this meeting to work toward this end. Our experience with the boards of health is more or less limited. We have not had much to do with any but the Boston and suburban boards, but from our experience I am satisfied that the appointment should be made by the boards of health.

MR. GEORGE H. ELLIS. If the statement is correct that the milk inspector is only a clerk, who when application is made for a license is simply bound to issue it, I don't see that it makes a particle of difference who appoints him, unless if he is appointed by the board of health he is made also the agent of the board of health, and as such agent looks after the source and the handling of the milk. As inspector under the present law he has not a particle of power in either case. When he decides that the law has been complied with as to the total amount of solids and butter fat, doesn't the province of the inspector end? Is it the province of the inspector to consider the health question? Isn't it that side of the question that this Association is considering?

VICE-PRESIDENT DURGIN. I should say that in one instance his authority did end as you state, but not under the board of health. When he is an officer of the board of health he carries out that and other matters which the board of health thinks proper to institute. The board of health aids the inspector by adding and enforcing other work than that of looking after the solids of the milk; for instance, dirty milk is quite as important to look after as the solids.

DR. DAVENPORT. I should like to ask if there has been a recent ruling that the authority of the board of health is simply to register the licenses, and not to prosecute violations of the statute in regard to milk.

VICE-PRESIDENT DURGIN. With us the inspector of milk does prosecute all cases of violation, whether it be upon the old statutory requirements on solids, or whether it be under the regulation of the board of health on the bacterial count, and the temperature, or anything else for which the board of health makes a request.

DR. WORCESTER. From what I have heard here I understand that an inspector of milk appointed by the selectmen, if it happened to be in a town where the selectmen were the board of health, as they are under statutory law unless others are elected, would be inspector and agent of the board of health. In other cases, where there is a board of health and the selectmen have the power of appointing an inspector of milk, he would be simply an inspector of milk, not an agent of the board of health. Where there is a board of health and the inspector of milk is appointed by the board of health, he is also an agent of the board, and in those cases would have power to go beyond merely issuing milk licenses. Is my surmise correct? If that is the case, it seems to me that the appointment of inspectors of milk should come under the board of health. In that way the inspector becomes an agent of the board of health, with full power to prosecute for any delinquency on the part of milkmen and milk producers. I can see no benefit from the selectmen having the power of appointing milk inspectors; I can see every benefit accruing to the public from the board of health having such power.

MR. COFFEY. I am heartily in favor of the recommendation of the Committee, because the city that I represent has just recently taken this step. For a number of years at Worcester we had tried at various times to get control of the milk department, but did not succeed. Two years ago circumstances were such that the city council went to the Legislature, and a special act was passed at the request of the mayor and city council of Worcester, transferring the milk department to the board of health. The old law, as you are all aware, requires the appointment of the inspector by the mayor and confirmation by the board of aldermen. That is productive of quite frequent changes. It is apt to be a political football. It was not so at Worcester always;

some men stayed quite a long time in that office, but frequent changes were made even there, and in some places I understand a change is made almost yearly, or with the change of administration. The milk inspector's duties are defined by the statutes, and they are almost entirely the issuing of licenses and the testing of the milk to find if it is adulterated. By transferring it to the board of health we adopted a series of rules and regulations which gave him increased powers.

But there is one thing that has been alluded to here that is fundamentally wrong, and that is that he must license any one who comes in and makes application and deposits fifty cents. I don't know of any other license that is issued under the authority of the laws of Massachusetts in regard to which the same rule applies. I am a member of the license board of Worcester, in which we license about everything except liquor and marriage. We issue all the licenses that were formerly granted by the board of aldermen of Worcester, and we have the right to refuse a man if we don't consider that he is a proper person to carry on the business. In this matter of milk, a very important matter too, in fact very much more important than lots of those licenses that the licensing board has the right to refuse if it deems the applicant unfit, we have no right, as I understand it, to refuse; we must grant a license to a man who comes in and who may be very filthy in his personal habits and his personal apparel. That man we must grant a license to carry on the milk business if he puts fifty cents on the counter and makes application. The law in that respect ought to be changed. If it is presented to the Legislature it will be changed, because on the face of it its necessity is so apparent that I don't think it needs very much argument to convince any committee of the Legislature of the need of it.

Another thing perhaps might be done. The milk inspector under a general law might be made the agent of the board of health. He should not be an independent or a semi-independent person, with certain powers defined by the statute, but he should be an agent of the board, the same as any other man in the employ of the board, empowered to carry out its orders and enforce its rules and regulations. The whole question of milk inspection should be transferred to the board of health, with the right to appoint an inspector of milk just as they appoint a plumbing inspector or a general inspector, and he should have then the powers that the board would give him to enforce the rules or regulations that might be made by them in the interest of pure and clean milk.

If you are going to do anything you must do it before the next meeting of this society, which takes place the last Thursday in January, too late to introduce any new matter in the new Legislature.

MR. BOLLING. In connection with what Mr. Coffey has said, does not a health board at present have power to appoint agents to execute its regulations? If it had the appointing of the milk inspector he would be an agent of the board with power to enforce any special regulations concerning milk that the board might establish.

MR. COFFEY. I move, Mr. Chairman, that the report of the Committee be accepted as a progress report, and that they be instructed by this organization to prepare a bill, after consultation with the executive officers of the State Board of Health, for introduction at the next session of the Legislature.

(The motion was adopted unanimously.)

The paper on "Conveyance of Bacteria by Sewer Air," by Prof. C. E. A. Winslow of the Massachusetts Institute of Technology, is withheld for the present at the request of the National Association of Master Plumbers, for whom the experimental work was done. After presentation to that Association it will appear in full in this Journal. — EDITOR.

COMMUNICATIONS

THE PRESENT MANAGEMENT OF SMALLPOX IN MINNESOTA

(Communicated by request of the A.J.P.H.)

In October, 1906, the following recommendation was adopted by the Minnesota State Board of Health:

> "It having been established that smallpox will not occur in a well-vaccinated community, and that all attempts to restrain this disease in a community not protected by vaccination, by means of quarantine, will fail; that quarantine in a well-vaccinated community is unnecessary; that attempts to control the spread of smallpox by means of quarantine are unscientific, irrational, expensive and misleading; that, in laying down strict rules for the quarantine of smallpox, sanitary authorities are favoring unscientific and illogical methods for its control and are conveying false ideas as to the safety of the public, the Minnesota State Board of Health advises that after Jan. 1, 1908, further attempts to control smallpox by means of quarantine shall be abandoned."

The reason for postponing action on this recommendation until Jan. 1, 1908, was that time might be given those who wished so to do to provide for their own and others' protection through vaccination.

On Aug. 6, 1907, said State Board of Health, following out the above recommendation, formulated the following regulations:

> "The local health officer having knowledge of, or having reason to suspect, the existence of smallpox, shall investigate, and at once place upon the house where smallpox exists a sign setting forth the facts. This sign is to serve only as a warning to those who may wish to avoid the house, and not as an indication of quarantine. When the attending physician considers a smallpox patient as having recovered, he shall report the facts in writing to the local health officer, who shall thereupon remove the warning card from the house. The patient must not leave the house until after the removal of the warning card." [Provisions for terminal disinfection and the reporting of cases.and deaths follow.]

It so happened that Minnesota was in the midst of an epidemic of a mild type of smallpox when these new regulations went into effect,— a most trying test, for if said new regulations were to prove inefficient the smallpox morbidity should at this time have increased and persisted. A deluge of criticism was poured upon the State Board by those who had not studied the conditions. As a matter of fact, the full-fledged epidemic present before the new regulations went into effect emphasized the inefficiency of the old quarantine regulations. It was not strange that such an outbreak should be continued into 1908, as it was.

The smallpox record in Minnesota for the last five months of 1907 and the first seven months of 1908 is as follows:

1907.	Cases.	1908.	Cases.
August	52	February	1224
September	51	March	1135
October	121	April	1093
November	313	May	909
December	662	June	407
January	936	July	233

From the preceding it will be noted that the number of cases of smallpox did increase during the first four months after the new regulations went into effect, but following this there was a decrease from month to month, as shown in the records of May, June and July. The fact that the morbidity rate diminished under the new regulations would seem to weaken the value placed upon the old quarantine regulations.

The Minneapolis and St. Paul health officials were not favorable to the new regulations. The city council of Duluth ordered the old rigid regulations of the State Board, in force before Jan. 1, 1908, to be continued. The record for these three cities during the period already referred to is as follows:

1907.	Minneapolis.	St. Paul.	Duluth.
August	No report.	5	No report.
September	No report.	5	No report.
October	No report.	66	No report.
November	68	110	19
December	82	65	34
1908.			
January	106	65	96
February	97	45	39
March	94	61	105
April	117	34	114
May	38	32	80
June	20	83	84
July	No report.	38	29

It would thus appear that these cities which were under the same regulations relative to the control of smallpox as those prior to Jan. 1, 1908, made no better showing in morbidity rates than did the State at large which was under the new regulations. It might seem as though the continued high rate of smallpox in these three cities after January 1 was due to imported infections from the country districts, but the records do not support this possibility. It would seem, therefore, that these records indicate the impossibility of controlling smallpox *with quarantine*, even under careful sanitary supervision. As a matter of fact, Duluth permitted prisoners who had been transferred from the jail to the quarantine hospital to escape. Truly, if patients cannot be restrained in a quarantine hospital, how are they to be restrained in private residences?

The health commissioner of Chicago raised the question as to whether Minnesota should not be quarantined against after the new regulations relating to smallpox went into effect. He announced that Chicago did not want smallpox infection from Minnesota. This commissioner was thereupon asked to advise the Minnesota State Board of all smallpox infections reaching Chicago from Minnesota. This he promised to do and reported three such cases prior to Feb. 8, 1908, for that year. Of these three cases one was from St. Paul, one from Duluth and one from the State at large. As both St. Paul and Duluth were under the same regulations at the time these two infections went to Chicago as prior to Jan. 1, 1908, the new regulations of the State Board could not be held responsible for these infections.

One of the Chicago sanitary officials stated in discussion at the American Medical Association meeting in Chicago in June, 1908, that Chicago was receiving smallpox infection from Minnesota, but Minnesota has received no notification of such infection beyond the three cases already referred to, nor do the Chicago records support the statement of this official, as shown as follows:

SOURCES OF SMALLPOX INFECTIONS IN CHICAGO, JAN. 1 TO JULY 25, 1908.*

	Cases.		Cases.
Chicago	47	Texas	1
Illinois (outside of Chicago)	12	Kansas	1
Wisconsin	1	Oklahoma	2
Minnesota	3	California	1
Michigan	1	Tennessee	1
Indiana	4	Washington	1
Iowa	2	Montana	1
Missouri	5		
Total			83

Of the 36 infections from outside of the city of Chicago, one was from a district in Minnesota under the new regulations and 35 were from cities or States presumably still practising rigid quarantine for smallpox. Chicago with its 47 infections is also supposed to be under rigid quarantine supervision. Apparently quarantine neither prevents infection in Chicago nor the importation of smallpox from other sections.

It would seem that the stand taken by Minnesota relative to the control of smallpox has set other sanitary officials thinking. I am advised that one of the western Canadian provinces is considering the question of adopting regulations similar to those of Minnesota. North Dakota is now under such regulations, and another western State is about to consider action even more radical than that taken by Minnesota.

The argument submitted in favor of the action of the latter is in part as follows:

> "I believe there is not a health officer in the United States who is not fully convinced that vaccination will prevent smallpox, and that quarantine at best is only a

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* Taken from the Chicago *Weekly Bulletin*.

> partial preventive. The people who are opposed to vaccination depend upon quarantine to protect them.
>
> "This quarantine must be maintained at the expense of all the people of the State, in order to protect the few. Is it right that where we have an absolute preventive, obtainable at a nominal cost, the entire people of the State should be put to a heavy expense in order to protect the few?"

And it is, therefore, proposed that "persons suffering from smallpox shall be allowed to go at large as are persons afflicted with a non-communicable disease."

In Minnesota many careful thinkers have expressed their approval of that State's new regulations.

After the protest from Chicago relative to imported cases of smallpox from Minnesota, the State Board of that State felt that it did not wish in any way to be party to the spread of smallpox into other States. It therefore passed the following regulations relative to the unvaccinated:

> "Following an exposure to smallpox, every individual who cannot show evidence of a recent successful vaccination or a recent attack of smallpox must be vaccinated within three (3) days of the first exposure or placed under the same isolation restrictions as smallpox patients.
>
> "If smallpox prevails in a community, or if the disease appears in a school, all unvaccinated teachers and pupils must be excluded from school for a period of three weeks unless vaccinated within three (3) days of first exposure. Failing to comply with this requirement, the school must be closed for a period of three weeks.
>
> "If smallpox appears in any class in any college in Minnesota, all unvaccinated teachers and students in the class must be excluded from recitations for a period

> of three weeks unless vaccinated within three (3) days of first exposure. Failing to comply with this requirement, the classes attended by such teachers or students must be discontinued for a period of three weeks."

On deliberate consideration of conditions the Minnesota State Board of Health feels that it has made no mistake in its new regulations, unless it is that they are not sufficiently radical.

H. M. BRACKEN.

TRAVELING TUBERCULOSIS EXHIBIT

To the Editor of the American Journal of Public Hygiene: The Boston Association for the Relief and Control of Tuberculosis has a traveling tuberculosis exhibition, which has already been used in a good many cities of the State by boards of health and other organizations for the education of the people in their cities in regard to the means of prevention and relief of tuberculosis. The exhibition consists of models of window-tents for obtaining fresh cold air in the sleeping-room, without reducing the temperature of the whole room to that out of doors; tents, shacks, sleeping-balconies, effect of dark unventilated rooms on health, and photographs and other illustrative matter in regard to the sanitaria in Massachusetts, and also material in regard to hospitals which have been and are being erected and other means taken in the State of Massachusetts and elsewhere for the relief and control of tuberculosis. I take this opportunity to mention the matter to the chairmen and secretaries of the boards of health in communities where the exhibition has not already been used. If any of them feel that it would be useful in their city or town I would be very glad if they would communicate with me at 4 Joy Street, and we can make an engagement for use of the exhibition in their city or town from four to eight days, or longer if it seems desirable, at any time after the first of January. The cost of holding an exhibition can be kept, for a period of eight days, well within $150. It is possible to do it for $100, but it does not seem efficient to do it for $100. The third $50 is very much better spent than the first or the second. That simply means that it is the advertising cost which gets the results out of the use of the first $100, which is the fixed charge. I would be very glad to hear from anybody to whom such an engagement seems desirable.

W. E. KRUESI, *Secretary.*

PERSONAL HYGIENE

By PERCY G. STILES, Ph.D.
Instructor in Physiology, Massachusetts Institute of Technology

A BRITISH CRITICISM OF REDUCED DIETS. The advocacy of low feeding (Fletcher, Chittenden, Fisher) has been mainly confined to America. We have previously called attention to the strong counter-movement in this country in which Benedict has been prominent. There has just now appeared a highly interesting and important address by Sir James Crichton-Browne dealing with the subject under the title, "Parsimony in Diet." * No extended review of this article can be undertaken, but certain portions of it call for consideration.

The fact most emphasized by the writer is the obvious one that if the New Haven workers and their enthusiastic disciples at Battle Creek are distinctly in the right, they form a very slender company of elect in an unregenerate world. The people whose diets most nearly approach their standard are those whose poverty denies them what they crave. The protein ration of the very poor is Chittenden's ideal. The quantity of food furnished in British prisons corresponds closely with what he recommends. Prisoners fed according to this scheme deteriorate physically; and we have the testimony of John Burns, based on a voluntary experiment, that the suffering from hunger is cruelly intense.

It is most important to account for the disparity between the experiences of students who grow strong upon minimal feeding and those of prisoners whose health and strength decline with the same quantity of the food-stuffs. Of course in one case the food is attractive and varied, in the other simple and monotonous. But hunger might be expected to insure an economical use of the diet, no matter how coarse and plain. The mental condition of the two classes may have a bearing on their nutrition, but it is hard to see why an intellectual man should need less food than an illiterate of the same weight. It seems to us (and this is on our own responsibility, and not Crichton-Browne's) that the element of difference between the two is that of *previous condition.* The subjects who have been so well and active for considerable periods on Chittenden's diets have been well nourished to start with. The majority of prisoners have not. They have been deficient in reserve stores. Such persons seem to be well adapted to give us indications of the sufficiency or the inadequacy of a given diet. Improvement or injury cannot be long delayed.

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*Journal of the Royal Institute of Public Health, Vol. XVI, No. 8, p. 471, No. 9, p. 527.

Crichton-Browne, like Benedict, concludes that temporary success with a low ration cannot be held to prove its superiority. Nothing less than lifelong health with such feeding, or better still the prosperity of successive generations, can fully justify such a departure from instinctive practice. Our author states that British laborers lose vigor and efficiency at an age of about forty years. For a long time they have been strong and active with no obvious sign of being underfed. When the comparatively early decline sets in, is it not reasonable to suppose that the underlying cause is to be found in a diet which was all the time below the optimum? The ill effects of overeating are long delayed, and it is not strange that the physical results of underfeeding are equally slow to appear. New England farmers certainly consume Atwater rations rather than the Chittenden type, and their capacity for hard work does not decline at forty as a rule.

It must be admitted that it is possible to overestimate the importance of diet as influencing the health of this or that class of people. We must not leave out of account other factors, such as hours of sleep, ventilation, monotony or variety in life, happiness or discontent. But it seems more and more clear that when these other conditions are unfavorable, liberal feeding can partly offset their effects. Is it likely that the experiments of Chittenden and Fisher would have been so striking if their subjects had been made to endure tenement-house conditions? It is privately admitted that some severe cases of "blues" developed at New Haven. With depressing surroundings this tendency would have been serious.

The question of resistance to infection is one which has to be faced. Crichton-Browne is positive in his belief that the older and more generous dietetic standards make for protection against the lodgment of germs and better the chances in the struggle when disease already exists. In support of this position he cites the practice of rich feeding — sometimes incredible in quantity — prevailing in many successful sanataria. Reference to his paper will reward the student of these timely questions.

VETERINARY HYGIENE

By W. L. BEEBE, D.V.M.
Bacteriologist for the Minnesota State Live Stock Sanitary Board.

THE PRESENCE OF TUBERCLE BACILLI IN THE FECES OF TUBERCULOUS CATTLE. The presence of the tubercle bacilli in the feces of animals that have reacted to the tuberculin test has been demonstrated by several observers. In 1907, Schroeder and Cotton of the United States Department of Agriculture, Bureau of Animal Industry, published a bulletin entitled "The Danger from Tubercle Bacilli in the Environment of Tuberculous Cattle." The cattle used in this experiment were seven animals that had been proven to be tuberculous by the tuberculin test and three non-tuberculous cattle that were given a small amount of culture of tubercle bacilli in their drinking water. One of the tuberculous animals was known to have been affected for several years, another was proven to be affected with generalized tuberculosis by a post-mortem examination after the experiment, and the others were supposedly recent cases.

To sum up the results of the investigation it was found that among seven natural cases of tuberculosis, five, or 71.43 per cent, were passing acid fast bacilli that microscopically resembled tubercle bacilli. The two that failed to show tubercle bacilli were a cow with an affection limited to one post-pharyngeal gland, and a young steer in which the presence of tuberculosis would not have been suspected if a tuberculin test had not been made. The authors in the summary state that "The feces of four of the five cattle were used in inoculation test and were found to be infectious in two cases. To these a third must be added as a subsequent inoculation test hereinafter described will show." The three cows that were given cultures of tubercle bacilli in their drinking water showed the presence of tubercle bacilli in their feces on microscopical examination. The feces were shown to be infectious from one of these cows by guinea-pig inoculation, and by the feeding of the feces of the other two cows to hogs.

The saliva, nasal discharge and urine of two cows and the milk of three other cows were tested for the presence of tubercle bacilli by microscopical examination and guinea-pig inoculation, and the milk also by ingestion experiments. All tests were negative with the exception of the saliva of one cow, which constantly produced tuberculosis in guinea pigs inoculated with it. The presence of tubercle bacilli in the saliva is accounted for by the authors by the fact that this cow coughed a great deal. It must be borne in mind that this might frequently be the case in cattle, as the mouth is usually always open if the animal coughs violently, thus the mucus is expelled into it.

Shortly after the appearance of Schroeder and Cotton's bulletin, Reynolds and Beebe, of the Minnesota Experiment Station, published a bulletin entitled "Dissemination of Tuberculosis by the Manure of Infected Cattle." The material for this work was obtained from forty-three head of cattle that had previously reacted to the tuberculin test. Twenty-two of these were pure bred and grade Shorthorns, Aberdeen, Angus and Hereford cattle, that had been rejected from the University herd on account of their having reacted to the tuberculin test. Some of these animals first reacted several years ago, and had been kept in isolation ever since. The remaining twenty-three animals were pure bred Shorthorns and grades which were kept upon a stock farm under the Bang system. The majority of these animals had first reacted to the tuberculin test about two years previous to the time this investigation was started. There were a few of these, however, that had reacted six months after the first test and were then stabled with the other tuberculous animals. The authors state that some of these animals from which samples were taken were presumably badly affected, as most of them had been known to be tuberculous for at least two years, and during that time they had been confined in a barn for at least six months of the year. These workers relied almost wholly upon inoculation of guinea pigs and also to some extent upon smear preparations.

The feces were mixed with water and the coarse particles filtered out by passing it through cotton, and varying quantities of the liquid injected subcutaneously into guinea pigs. In all one hundred and fifty-three guinea pigs were inoculated, but only about sixty per cent lived, the others dying from septicæmia, etc. Of the forty-eight animals they had under experiment the feces of sixteen of them were tested three times, one cow five times and two cows four times. The feces of fourteen animals were tested for tubercle bacilli twice and of seven animals were tested for tubercle bacilli only once. Of the entire lot they were able to but four times demonstrate tubercle bacilli in the feces by animal inoculation, and all these being from one animal and at no time were they able to demonstrate their presence in smear preparations. The post-mortem notes of this animal show that the cow was badly affected with generalized tuberculosis, but no intestinal ulcers were found.

In July, 1907, Schroeder published another bulletin entitled "The Unsuspected but Dangerously Tuberculous Cow." In this bulletin the author reprints the examination of the feces of thirty head of cattle, twenty-four of which were removed from dairies and six others which were known to have been tuberculous for three years or more. Among the former ten, or a trifle over forty per cent, were found to be expelling tubercle bacilli, and among the latter all were expelling them. The cows removed from dairy herds had the general appearance of ordinary dairy cows. Even those that were expelling tubercle bacilli appeared to be and acted as well as those that were not expelling them. Butter made from one of these animals contained virulent tubercle bacilli after forty-nine days, as was proven by guinea-pig inoculation.

At the recent International Congress on Tuberculosis, Schroeder read a paper entitled "The Occurrence and Significance of Tubercle Bacilli in the Feces of Cattle." In this communication attention is called to the fact that the percentage that expel tubercle per rectum is found to double in about eighteen months, and the frequency with which tubercle bacilli can be detected in the feces of individual animals and the number of bacilli relative to the mass of feces passed also increases.

It will be seen that the results of Schroeder and Cotton's and Reynolds and Beebe's work is quite different. It is quite generally believed that the bacilli are discharged with the feces only when open tuberculosis exists in the respiratory organs or the digestive tract. Probably there is more danger in cattle from the respiratory than from the digestive tract, as intestinal ulcers are very seldom encountered in cattle. There is a possibility that the widely different results were due to the fact that the percentage of cattle affected with open tuberculosis in the herds examined by Reynolds and Beebe were very small. Post-mortem data on tuberculous cattle seem to show that forty per cent is a very high estimate for animals affected with open tuberculosis in the average herd. Perhaps the cattle that Schroeder examined were more badly affected with tuberculosis than the average herd, or it might be true that cattle can be expelling bacilli with the feces when the lesions are apparently closed, as is the case with milk. It has been proven by Bang, Ernst, Theobold, Smith and others that tubercle bacilli are present in the milk even when there are no apparent lesions in the udder.

The experiments of Reynolds and Beebe were apparently carefully conducted. They in all cases removed all the coarse particles from the feces which would have a tendency to produce irritation and sloughing at the point of inoculation, and it is quite evident that a large enough dose of the fluid was given to produce tuberculosis, even if the bacilli were present only in small numbers.

This is a subject of immense importance to the sanitarian and the farmer, even if only a few of the cattle are discharging tubercle bacilli with the feces, as it has been shown that much of the milk sold in cities contains feces in the milk sediments. In the West it is a common practice to allow the hogs to run behind the cows and pick the corn out of the feces.

As this is a subject of such immense importance it seems desirable that more work be done along this line.

MUNICIPAL SANITATION

By CHARLES V. CHAPIN, M.D.
Superintendent of Health, Providence, R.I.

EYE CLINIC FOR SCHOOL CHILDREN. In a letter to the Editor of this journal, Dr. Neff states that Philadelphia has recently established such a clinic. During the first three months following the opening of the clinic, 1,267 cases were treated, or at least examined. Three hundred dollars was set aside to furnish glasses to children too poor to buy them, and 345 glasses were so furnished. Dr. Neff reports great mental progress in many of the children, as indeed has been noticed wherever the eyes of school children have been examined and treated. The claim is made that Philadelphia is the first city to establish such a clinic, but there has been one in Providence for two years, and, if I am not mistaken, several other cities.

BABIES' DISPENSARY. The conviction is growing that in order to preserve infant life something more must be done than to distribute clean milk. Good milk for bottle-fed babies is a necessity, but the education of mothers in the care of children will do more than all else to reduce infant mortality. Hence the "Voluntary Visitors" of the English, the "Consultation de Nourrisson" of Paris, and the "Babies' Dispensaries" of this country. In the United States the trained nurse seems to be the most efficient agency in this particular phase of preventive medicine. One of the best plans for bringing the physician, the nurse, the milk station and the mother into successful coöperation is the Babies

Dispensary of which Cleveland furnishes an example, which is described by Gerstenberger in the *Archives of Pediatrics*, April, 1908, page 561.

CONTROL OF MEASLES IN BIRMINGHAM.* When the first case of measles appears in a school a circular is sent to the parents of all the children in the school, describing the symptoms of the disease, and asking them to keep their children at home on the appearance of the first symptoms. This plan was tried in four schools, with 1,213 children. During the period covered by the experiment seventy-four cases of measles occurred in these schools. In four other schools, during the same period, there were seventy-six cases.

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* Report of the Medical Officer of Health, 1907, page 23.

SANITARY ENGINEERING NOTES

By ROBERT SPURR WESTON
Assoc. M. Am. Soc. C.E.

BAMFORD FILTERS OF THE DEWENT VALLEY WATER BOARD.* A detailed description with drawings of the filters after the Puech system to be built at Bamford, England. This system, capacity 12,000,000 gallons per day, consists of two-thirds acres of roughing filters, four and one-third acres of sand filters, a four and a half million gallon clear water reservoir and the necessary adjuncts. The water is passed first through the gravel roughing filters to remove a large part of the suspended impurities. This makes it possible to use a fine sand filter for a much longer time between scrapings and so produces a better effluent at a higher rate than would be possible if the water were passed directly to the sand filters. Each set of roughing filters consists of three compartments in series, each containing finer gravel than the preceding. When clogged, these filters are washed by digging a trench to the iron plate which supports the gravel, and then playing a strong stream of water on the exposed surface, working the trench from one side of the bed to the other until the whole has been treated. The waste wash water passes away through the plate and under-drains. This system is the invention of M. Armad Puech, who claimed that it economized the expense of construction, material, maintenance and space. The bottoms of the sand filters are to be made of concrete covered with a layer of asphalt upon which the filter, consisting of sand supported upon graded gravel, is built. The article and illustrations show the details of construction very fully.

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* A. Williamson, A.M.I.C.E., Eng., 86, 100–3, July 24.

DEMANGANIZATION OF WATER BY MEANS OF ALUMINUM SILICATES (*Reinigung des Trinkwassers von Mangan durch Aluminatsilikate*).* The author gives history of the experiments with artificial zeolite specially recommended by Gans for the removal of Mn from the Breslau water. It is sold under the name of "Permitit," and has the following composition:

Loss on ignition	8.95%
SiO_2	49.60%
Al_2O_3	21.50%
CaO	9.75%
MgO	Trace
Fe_2O_3	.50%
Mn_3O_4	.09%
Undetermined	9.61%

Permitit is not alkali free, and a part of its constituents are soluble in water, especially in water containing CO_2. Hard, ferruginous water containing manganese and filtered through Permitit contains less Al, Fe, Mn and Si oxides and more CaO than before filtration. After a while the Permitit becomes saturated with Mn, but can be regenerated by treating with chlorides of Na or Ca. Results of careful tests to determine the optimum procedures for the regeneration of the chemical are given. CO_2 decomposes the silicate. After regeneration the Permitit again removes the Mn from the water. The absorption of Mn by the chemical is inversely proportional to the alkali dissolved by the water. Before the experiments the Permitit contained 0.31 per cent Mn. After using, it had taken up 2.25 per cent Mn. Author does not believe that its solubility, especially in CO_2 water, would prevent its technical use. Every water must be tested before Permitit can be recommended, because it is more soluble in some waters than in others. Mn held in solution by CO_2 (bicarbonate) is most readily removed. Ferrous but not ferric salts are absorbed. A filter six inches thick, operating at a rate of 10.7 million gallons per acre per diem, will purify successfully a water containing 0.1 part per million Mn_3O_4 for 140 days, while a filter operating with a water containing one part per million will last only 14 days between regenerations. The cost of chemical alone, exclusive of tanks, pumping, piping, reserve area and regeneration, is about $15.50 a million gallons. For cleaning, concentrated salt solutions are to be preferred to dilute, and washing should be continued until only a few parts per million of manganese remain in the wash water.

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* Contribution from the Hamburg Hygienic Institute, Prof. Dr. Dunbar, Director H. Noll. Gesund. Ing., Aug. 22, 1908.

TEN YEARS' STUDY OF CUPAR WATER SUPPLY WITH SPECIAL REFERENCE TO THE GERM CONTENT THEREOF.* A brief description of the Cupar water supply and account of experiments upon the removal of germs from it by sand filtration, including table of bacteriological examinations covering ten years. The filter beds are made up of washed quarry chips at the bottom covered by two feet of graded washed gravel of five degrees of fineness. Every six weeks, as the filter begins to clog, the top is scraped off, washed and replaced; after which the bed must rest at least a week before it regains its filtering efficiency. Bacteriological examinations were made above the filter, just below, and at the city taps and showed that (1) this method of sand filter when in working order removes over 90 per cent of the organisms from water containing from 900 to 1,000 per c.c.; (2) the natural range of alkalinity has no effect upon the germ content; (3) the germ content is distinctly greater at the point of delivery than as issuing from filter bed, probably, as experiment showed, because of the state of comparative rest in the pipes; (4) in an upland surface water the number of organisms which grow at blood temperature is a very small proportion of those grown at room temperature. Incidentally it is noted that water in a catchment area may differ chemically from that of the underlying geological formation. The Glenfield scraping process for removing incrustations from pipes is described and recommended.

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* C. E. Douglas (Medical officer of health), Cupar Fife, Edinb. Med. J., 23, 42–53, Jan.

ICE AND ITS NATURAL HISTORY.* Report of a lecture before the Royal Institution. The author explains the cause of the impurity of melted sea ice. His experiments have shown that sea ice and also glacier ice is a conglomerate made up of pure ice and frozen salt solutions of varying composition, according to the temperature of freezing. Upon raising the temperature the more concentrated solid solutions become liquid first at temperatures below 0°, yielding bitter water because magnesium salts freeze at very low temperatures. These conclusions check with Petterssen's value for the latent heat of sea-water ice, 50, and are further confirmed by photographs made by the author.

DEFECTIVE SPECIFICATIONS FOR SEWAGE DISPOSAL PLANTS.† The Editor notes that the Quartermaster's Department, not the Corps of Engineers of the United States Army, is responsible for defective specifications for sewage disposal works at army posts noted in Eng. News, 59, 533.

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* Buchanan, J. Y., Eng., 85, 688 (May 22).

† Ed. Eng., 59, 613.

CORROSION OF STEEL WATER-SUPPLY CONDUIT AT ROCHESTER, N.Y.* Two water-supply conduits lead from Hemlock Lake to Rochester. The older, of wrought iron coated with a mixture of Trinidad asphalt and coal-tar pitch, has corroded but little. The newer conduit installed in 1895, fourteen years after the older, was built of soft, open-hearth steel plates containing not over 0.6 per cent Mn and 0.06 per cent P. It was coated with three kinds of coatings, namely, California asphalt, asphalt and pitch, and baked japan. The baked japan coating appeared to be the best when the pipe was in the trench. Since 1900 rust leaks have appeared on the outside of the pipe to a considerable extent. Damage results when three conditions co-exist, namely, ineffectual coatings, normally wet soil and steel of heterogeneous structure. Corrosion was caused by electrolysis and was confined to places where excessive moisture was uniformly present. Electric corrosion is most marked where the current is concentrated on small areas. No permanently effective coating has been discovered. Corrosion could be prevented by drainage and by avoiding the maximum water level. Cast iron is most durable of all of the irons used for pipe, and wrought iron is much better than mild steel. Experience at other places bears out that at Rochester. In the article the details are described carefully.

SMOKE ABATEMENT IN CHICAGO.† A movement has been inaugurated in Chicago on an educational and economic basis by the Illinois Coal Operators Association, the Chicago Smoke Abatement Association, the Western Society of Civil Engineers and the City Smoke Inspection Bureau, to improve the atmospheric conditions in the city. This is superior to notification and fines, the methods usually employed to reduce the nuisance. Experiments at the

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* R. H. Gaines, Eng. News, 59, 578.

† Eng. News, 59, 669, June 18.

University of Illinois show that Illinois bituminous coals can be burned without smoke in properly designed furnaces with careful firing.

STATE CONTROL OF SEWAGE DISPOSAL WORKS.* The Editor notes the differences between English and American conditions, especially regarding the density of population, flow of the streams and the strength of sewage. A review of the progress in State control is given. The time has not yet come to prohibit the discharge of all crude sewage into streams. A discussion of the various views of what constitutes satisfactory sewage disposal in the case of both old and new plants follows. Each individual case should be judged on its merits. In most States control stops with passing on the plans, but recently in Ohio the State Board of Health has been given supervising control, not only over the construction, but the operation of sewage disposal works, — a most excellent example to other States.

PUECH ROUGHING FILTERS OF THE DERWENT VALLEY WATER BOARD, ENG.† A description of the Puech system of preliminary treatment of water previous to filtration. This consists of four roughing filters, one filled with coarse, one with medium and two with fine gravel through which the water flows in turn at rates varying from 110 to 30 million gallons per acre per day. The filters contain a two-foot layer of sand operated at a rate of 3.87 million gallons per acre per day. The gravel filters are washed *in situ*, the material being coarse enough to permit this method of cleaning. The only other plant in England is a small one at the East London Water Works. This gives satisfactory results. At least twelve plants are in operation on the Continent.

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* Ed., Eng. News, 60, 179, August 13.

† Williamson, Eng. News, 60, 236, August 27.

LABORATORY TESTS OF EFFECT OF STORAGE ON VITALITY OF TYPHOID BACILLUS IN LONDON WATER SUPPLY.* These tests by Dr. Houston, Director of Water Examination, were published in a report to the Metropolitan Water Board of London, and show what other experimenters have reported, namely, that if storage be sufficiently long the water will be free from typhoid germs. Dr. Houston strongly advocates long storage as a preliminary to filtration. He even prefers a rapidly filtered, well-stored water to a slightly filtered, unstored water, and believes that mechanical filters might be used, provided the water was subjected to long storage before filtration. Tests show that the typhoid germs disappeared from water (100 c.c. test samples) within nine weeks. The author condemns the use of raw, unstored water for filtration purposes, and recommends tentatively a four weeks' period of storage as affording a sufficient margin of safety.

ELIMINATING TYPHOID GERMS FROM WATER.† The tentative suggestion of Dr. Houston of London to eliminate practically all typhoid germs from water by a four weeks' period of storage is disapproved for American practice where the per capita consumption of water is high, because the heavy capital charges for land and construction necessary for the storage of water would far exceed the combined capital and operating charges for satisfactory filtration.

OZONE TREATMENT OF CROTON WATER.‡ A letter regarding the experiments with the Blanken ozonizer at New York in 1907, written by the City Engineer of Bankok, Siam, and replied to by Mr. de Varona, who directed the experiments. Mr. de la Mahotiere believes that the apparatus failed because of insufficient contact between water and ozone, and destruction of the gas through compression, the latter due to forcing the air through a very deep tank containing the water. He also believes that the concentration of ozone,—about 1 mg. per liter,—was too low, and that drying the air by refrigeration introduced more complications than the use of lime or calcium chloride. He cites the good results obtained at Cosne (Fr.), where the previously filtered water is ozonized in a gravel tower in which water and ozonized air stream in opposite directions. The concentration is from 6 to 6.5 mg. per liter. Before filtration the water contains an average of 4,000 bacteria per c.c.; after filtration, one.

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* A. C. Houston, Eng. News, 60, 247, September, 1908.

† Ed., Eng. News, 60, 257, September, 1908.

‡ L. R. de la Mahotiere and I. M. de Varona, Eng. News, 60, 309.

In reply Mr. de Varona disclaims any responsibility for the design or operation of the plant. It was installed and operated by the owners, who assured the Department of Water Supply of New York that it would produce 85 g. of ozone per Kw. hr., and would operate in a reliable manner. He believes that the exposure of water to ozone in a tower and the drying of the air by chemicals would be impracticable for the treatment of large volumes of water. When the Blanken system operated regularly and properly, the results were excellent. The greatest objection was the prohibitive cost of the process.

INSPECTION OF DOMESTIC WELLS.* This is a report of chemical work in the laboratory which includes analyses of many samples of water from both surface and ground-water sources. The report also contains a *résumé* of the methods employed, which methods do not differ materially from those in common use in England and America.

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* Lab. of Internal Revenue Dept., Ottawa, Canada, Bull. No. 149.

VITAL STATISTICS

By MARSHALL LANGTON PRICE, M.D.
Secretary State Board of Health, Baltimore, Md.

THE TRUE POPULATION OF AMERICAN CITIES. Mr. C. Mayo of Milwaukee, in several letters, disputes the estimated population and the census population of the bulk of our American cities.* Mr. Mayo holds that the census population is too high, mainly on account of transients and the manner of taking the census at so much per head (which method is admittedly bad), and that the estimated figures of population are often derived from city directories, which are notoriously incorrect. The proof of these contentions he derives from inquiry and a mathematical *reductio ad absurdum.* As far as directory estimates are concerned, Mr. Mayo cites the inquiry conducted by Mr. Watterson, of the *Louisville Courier-Journal*, in 1907, who found that the real population was to the directory population as one is to one and one-third; that is, for four names in the directory only three real persons lived in the city, the remainder were either dead or transients. A plan similar to Mr. Watterson's was tried by Mr. Mayo in Chicago, on his own responsibility. Mr. Mayo sent out one hundred letters addressed to one hundred short English names with reply postals included. Only twenty-one replies were received, and sixty came back from the Dead Letter Office, "not found." This is probably an extreme case, but serves to illustrate the unreliability of estimates founded on the city directories. As regards the mathematical method of proof, Mr. Mayo points out that the figures fail to tally in any way with the estimated population of one city which he takes as an example (Chicago). Thus Mr. Mayo points out that if the true population of Chicago were 2,170,000 as claimed for 1908, the figures for deaths, voters, births and school children should be, deaths (maximum and minimum), 50,000 to 42,000; voters, 650,000 to 600,000; births, 70,000 to 50,000; school children, 500,000 to 470,000. The actual records in these cases, however, showed that there were recorded in 1908, deaths, 24,000; voters, 390,000; births, 27,000; school children, 320,000. Mr. Mayo estimates the population of Chicago on the basis of deaths and voters at 1,200,000 for each, and on the basis of school children at 1,400,000, while on the basis of recorded births he estimates the population at only 1,000,000. While Mr. Mayo's figures are undoubtedly too high for all of these factors, in American cities where the enforcement of the laws is notoriously lax (and this applies even to his minimum figures), still it is fair to infer from an examination of his figures that the true population of Chicago does not exceed 1,800,000. So far Mr. Mayo's mathematical logic is correct and clear. He applies, however, the law known as Arym's law to the returned figures of death rate and average age at death.

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* Letters C. Mayo to M. L. Price, 1908.

ARYM'S LAW. Arym claimed that there was a fairly constant mathematical relation between the annual number of deaths, the average age at death, and the population. This he applied by the following formula: Annual deaths × average age at death = population (exclusive of last year's births). Undoubtedly this formula in a rough way corresponds with actual figures, but considering the fluctuation in population, the variation in the number of deaths annually, and in the average age at death, the formula could not be safely applied even in the way Mr. Mayo suggests (to confirm the figures of population and death rates), at any rate in our American cities where the distribution of population by ages varies so much from the normal of the older cities.

AVERAGE AGE AT DEATH. The uncertainty of calculations based upon the average age at death is shown by the vital statistics of Maryland. In this State the actual age at death is returned for each death record by means of one of the standard adding machines. These are entered with three decimals, so the maximum possible error would be somewhere in the third decimal. These returns are made by month and by counties. Not only is there a marked variation in the average age at death by months as would naturally be expected (29.925 in July and 40.437 in February), but the average age at death by counties varies from 28.509 to 43.752. If Arym's law is true now, it was not true three centuries ago when the average age at death was in the neighborhood of fifteen years, and it will not be true in the future, when we can confidently expect the average age at death to be very greatly raised, while the annual number of deaths will remain fairly constant.

THE VALUE OF HUMAN LIFE. Numerous attempts have been made to estimate the value of a human life. The main difficulty of the problem lies in the extreme complexity of the relations of the individual to his family, to his community and to the State. Most difficult of all is to give a money valuation to the value of the life to the person who loses it. Certainly it is too narrow a view to take that the value of an individual's life to the State can be measured in money merely by *per capita* taxation. The problem is still further complicated by the fact that for unskilled laborers at advanced ages whose work requires severe muscular labor the period of production is over, and with it the cconomical usefulness of the individual. On the other hand, in the sedentary occupations requiring only mental labor, the productive period may extend to an advanced age. Naturally it is necessary to establish some standard or unit from which comparisons can be made. Considering all these points it seems best to adopt what may be called the "life capital method" for the usual method of calculation, and to adopt the "life capital" as the standard unit of calculation. In this method we calculate the capital accumulated during the life of the individual from the beginning of his working period up to the time of his death. If we then assume his annual income to remain constant up to the end of the normal working period, the amount which he would have accumulated represents the potential loss in life capital. In order to make an estimate of potential loss we must, in the absence of definite data, agree upon the duration of the working period. It is perhaps fair to fix the beginning of this period at the twentieth year, and the end at the sixty-fifth year. Certainly the average period of manual labor is practically over at sixty-five. To cite an example: An individual who makes an annual income of three hundred dollars begins work at the age of twenty and dies at the age of thirty-five. During this time he has earned a capital of $4,500, while if he had worked during his full working period, and his earning period had not been interrupted by death, he would have earned a capital of $15,000. There will have been a potential loss in this case of $10,000, shared by the individual, his family and the community. As far as the individual is concerned we may speak of him as having lived a $4,500 life in this case, where he should have lived a $15,000 life. Such calculations are most interesting when applied to specific diseases. In this class of calculations we have what may be called the actual cost of the disease, which includes not only the loss of income from disability during life, but another item which is often surprisingly large, even in persons of small income, namely, the expenditure for drugs, nursing, physicians' bills and traveling expenses. The expenditures under the last items are particularly large in the case of tuberculosis. In Maryland investigations were made and fairly accurate figures obtained in a number of actual cases, presumably below the average income of wage-earners. The results of this calculation were as follows: the average total money loss incurred by 258 males (wage-earners) was $15,264.85, and the average loss incurred by 70 wage-earning females was $9,140.06. The number of deaths from tuberculosis at that time was 2,669. About 2,000 of these deaths, in round numbers, occurred at the wage-earning ages. If these deaths were equally divided among males and females the loss from the death of wage-earning males would be $15,264,850, and the loss from the death of wage-earning females would be $9,140,060, giving a total of $24,404,810.

UNIFORM RETURN OF VITAL STATISTICS. The best of our American statisticians are working faithfully to secure uniformity in the return of vital statistics. Dr. Cressy L. Wilbur has worked especially hard to have uniform rules of statistical procedure adopted by the Vital Statistics section of the American Public Health Association, and the American Medical Association and other influential bodies interested in the use of figures.

In the past vital statistics have been compiled according to the whim of the registrar, and such compilations have frequently been clumsy and indefinite, and always comparable with difficulty with the vital statistics of any other registrar. Most persons who have made studies of special statistical subjects can recall the exasperation which they have felt to find, after endeavoring to make a compilation of deaths from certain causes by five-year periods, that some registrars had dropped their five-year periods abruptly after the twentieth year and made their returns thereafter by ten-year periods. The "Rules of Statistical Procedure" provide for the return of deaths by years up to the fifth year, and their return thereafter by uniform quinquennial periods. The Conference of State and Provincial Boards of Health has taken a step in advance to this plan by appointing a special committee of three to secure uniformity in the returns of vital statistics. The work of this committee will include not only the uniform return of ages, but also uniform forms for tables and the graphic representation of statistical facts. Particular attention will be given by the committee to the return of the principal causes of death, both in tabular and graphic form. The committee will probably recommend "approved" and "alternative" forms.

A STATISTICAL STUDY OF INFANT MORTALITY. Edward Bunnell Phelps has contributed an interesting study in the last quarterly publication of the American Statistical Association.* The paper is perhaps the more interesting from the fact that the author does not attempt to draw dogmatic conclusions. The purpose of the article is to compile the available information concerning infant mortality in convenient form for study and comparison. The author denies that any actual concerted effort has been made to reduce the infant mortality previous to the twentieth century. The general trend of the paper is expressed in the quotation from Dr. George Reid, Medical Officer to the Staffordshire County Council: "Although a steady decline has taken place in the general mortality, coincident with, and no doubt in the main consequent upon, sanitary progress, it cannot be said that the infant mortality has diminished in like proportion."

The statistical results cannot be said on the whole to be very encouraging. The results in Massachusetts are characteristic of the whole study. During the twenty-five-year period 1856–1880 the death rate per thousand births under one year was 150.1, and in the period 1881–1905, 153.7. Naturally the statistical findings are very much influenced by the lamentable inaccuracy of birth records everywhere, but the results in Massachusetts and in European countries, where the birth returns are approximately correct, would seem to indicate either that sanitary administrations have failed to grasp the importance of infant mortality or that the present imperfect methods do not adequately control the situation.

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* Volume XI, September, 1908.

VITAL STATISTICS AND THE DOCTRINE OF PROBABILITIES. Statistical conclusions are frequently drawn without due consideration to the doctrine of probabilities. Fallacies in connection with probabilities are particularly common. The crudest of these fallacies, as far as they concern vital statistics, is the return of mortality or morbidity by occupation, without reference to the number of persons engaged in each specified occupation. Thus it is very commonly announced that "tuberculosis is most common in housewives," merely because this is the largest class of returned occupations. The question of domiciliary infections in tuberculosis should be carefully reviewed from the standpoint of probabilities. Thus if, of fifty thousand houses, five hundred are infected with tuberculosis, what, according to probabilities, will be the number of houses which will contain two cases of tuberculosis, or three cases, four cases, etc., independent of infection? There seems no doubt whatever of the frequency of house infection, but none of the American figures offer satisfactory proof of this upon a mathematical basis. The importance of such accurate and systematic investigations will be understood from the recent attempt of one investigator to revive the hereditary theory of tuberculosis on the ground that tuberculosis is seldom communicated from husband to wife and *vice versa*. The extreme ease with which fallacies may arise should make us very cautious in accepting statements of this kind. The disease itself diminishes the probabilities of marriage. During the marriage period the disease is prone to take a rapid course, especially in women, and the opportunities for the prolonged and intimate exposure necessary to cause tuberculous inoculation are generally lacking. It is quite in accord with these views that we find tuberculosis more frequently communicated from husband to wife than from wife to husband, and that we find tuberculosis communicated to children much more frequently through the mother than through the father. All these facts are easily explainable on the doctrine of relative exposure. We must deplore the misuse of statistics to revive discredited theories on insufficient or untenable grounds, especially when such efforts do material damage in overshadowing the dangers of direct infection.

STATISTICAL FALLACIES. One of the most common of the statistical fallacies arises from the failure to consider the problem of age in its relation to mortality and morbidity. The well-known studies of Reinke tended to show that the death rate from tuberculosis was diminished, and the duration of the disease increased, with the increase of income, within certain limits. While Reinke's main conclusions were undoubtedly correct, his figures need revision, as he took no account of the factor of age in his calculations. As is well known, income increases proportionately with age. Tuberculosis, on the other hand, diminishes in severity and frequence as age increases, and a large part of the favorable influence which Reinke ascribed to increased income was doubtless really due to increased age.

PUBLIC HEALTH LEGISLATION, NEWS AND NOTES

By F. H. SLACK, M.D.
Director, Boston Board of Health Laboratory

THE AMERICAN PUBLIC HEALTH ASSOCIATION held a most successful meeting in Winnipeg, Manitoba, August 25–28. It is an evidence of the amazing growth of the Canadian provinces that Winnipeg could successfully bid for the presence of this convention of the leading health association of America, and there is no question but that the gathering together of these public health specialists, the excellent program presented, and the opportunity given for the local men to get in touch with leading experts will give a great impetus to public health legislation in Canada and many times repay them for their generous and whole-souled hospitality.

Dr. Gardner T. Swarts of Providence, R.I., was elected President of the Association for the coming year. The other officers are, Dr. R. M. Simpson of Winnipeg, Manitoba, First Vice-President; Dr. Jesu Chico of Guanajuato City, Mexico, Second Vice-President; Major Chas. F. Mason, M.D., of Washington, D.C., Third Vice-President; Dr. Charles O. Probst of Columbus, Ohio, Secretary; and Dr. Frank W. Wright of New Haven, Conn., Treasurer.

The Laboratory Section officers are, Chairman, Dr. J. J. Kinyoun of Washington, D.C.; Vice-Chairman, Dr. Wm. R. Stokes of Baltimore, Md.; Secretary, B. R. Rickards, S.B., of Columbus, Ohio; Recorder, Dr. H. D. Pease of Albany, N.Y.

The officers of the Municipal Health Officers Section are, Chairman, Dr. W. C. Woodward of Washington, D.C.; Vice-

Chairman, Dr. A. J. Douglas, Winnipeg, Manitoba; Secretary, Dr. E. C. Levy of Richmond, Va.; and Recorder, Dr. C. V. Chapin of Providence, R.I.

The Section on Vital Statistics elected as Chairman, Dr. Chas. A. Hodgetts, Toronto; Vice-Chairman, Dr. Wm. H. Guilfoy of New York; and Secretary, Dr. W. R. Batt of Harrisburg, Pa.

The next meeting of the Association will be held in Richmond, Va., October, 1909.

NEW CHIEF FOR OHIO STATE LABORATORIES. Burt Ransom Rickards, S.B., Director of the Boston Board of Health Laboratory, has resigned his position to accept one as Chief of the Ohio State Board of Health Laboratories.

Mr. Rickards was born in Cambridge, Mass., in 1876, and is a graduate of the Massachusetts Institute of Technology, Department of Chemistry, 1899, with the degree Bachelor of Science.

He was Instructor in Analytical Chemistry at Lowell, Mass., in the Textile School, 1899, 1900. From 1900 to 1905 he held the position of First Assistant Bacteriologist in the Laboratory of the Boston Board of Health, and has been Director of the same from 1905 to date.

He is Secretary of the Laboratory Section of the American Public Health Association, Managing Editor of the AMERICAN JOURNAL OF PUBLIC HYGIENE, and Lecturer and Instructor in Public Health Laboratory work for the Massachusetts Institute of Technology. He is the author of many papers covering research work on various bacteriological and chemical problems.

BOSTON BOARD OF HEALTH LABORATORY. By promotion, Dr. Francis H. Slack becomes Director of the Boston Laboratory, and Dr. Burdett L. Arms, Assistant Director.

Miss E. Marion Wade has been appointed to the position of Bacteriologist, left vacant by Dr. Arms. Miss Wade is an honor graduate in Arts in the Department of Physical and Natural Science of Trinity University, Toronto, Ont., 1904. She has had special training in Bacteriology at the Summer Course of the Harvard Medical School, also special courses in Air Analysis and Water and Sewage Analysis at the Massachusetts Institute of Technology. For four months in 1907 she served as a volunteer assistant in the Boston Board of Health Laboratory, becoming thoroughly proficient in diagnostic work. She has since served as assistant to Mrs. Ellen H. Richards, Instructor in Sanitary Chemistry at the Massachusetts Institute of Technology, and as Analytical Chemist in the Research Laboratory of the General Electric Co., Schenectady, N.Y.

THE NORTH CAROLINA STATE BOARD OF HEALTH has secured the services of Mr. J. Wilfred Kellogg as Assistant Bacteriologist. Mr. Kellogg has had charge of the Filtration Plant at Washington, D.C. He comes to his new duties with a thorough training along bacteriological lines.

SAVANNAH, GA., makes announcement of the opening of the new bacteriological laboratory under the charge of Dr. Victor Bassett.

IOWA PASTEUR INSTITUTE.* A State Pasteur Institute has been established at Iowa City under the direction of Dr. Henry Albert, State Bacteriologist.

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* Journal A. M. A., Nov. 21, 1908.

BOOK REVIEWS

The Prevention of Tuberculosis. By ARTHUR NEWSHOLME, M.D., F.R.C.P. *Methuen & Co., London,* 1908. *Price, Seven Shillings.*

This work is written from the standpoint of the health officer. Every phase of the subject which is of interest to sanitary official is discussed with great clearness. One chapter deals with the trustworthiness of statistics, and the author shows that in England, at least, the decline in the death rate from phthisis is real and cannot be explained by transference to other diseases. The infectivity of the disease and the sources and portals of infection are as fully discussed as the limits of the work permit. The author believes that we are not as yet in a position to determine with any degree of accuracy the relative importance of the different sources and modes of infection. After reviewing the evidence he concludes that it is not unfair to assume "that from five to ten per cent of the total human mortality is due to infection from bovine sources." Assuming the remainder to come from human sources, he says that "tuberculosis is undoubtedly caused most often by domestic infection," and that "the intimate relationships of domestic life are much more likely than casual extra-domestic infection to be the chief means of spreading tuberculosis." But it is the person rather than the house that is chiefly dangerous, for he says: "Although it is in the highest degree desirable that such a house (where a consumptive has lived) should be efficiently cleansed and disinfected, it is unlikely to form a large element in the production of phthisis by domestic infection."

Part II of the work considers the means by which the decrease in tuberculosis is secured. Newsholme's well-known view is, that an important, if not the chief factor in the decline of tuberculosis is the increasing segregation of advanced cases in institutions, chiefly almshouses. Certainly the great array of figures which he presents indicates that such may well be the fact in the European countries from which the figures are drawn. The early recognition of cases is a prime necessity, and the responsibility of physicians is duly emphasized. A better organization of free medical service is urged in order to secure an earlier recognition of cases. Registration is essential, but is useless unless each case is followed. Every patient must be studied, taught, helped and encouraged. Hospital treatment should be furnished by the municipality, and the excellent work done by Newsholme at the contagious disease hospital in Brighton is an example for other cities to follow.

The price of this work renders it possible for every health officer to possess a copy, and he will find it a most useful handbook.

CHARLES V. CHAPIN.

The Hygiene of Medical Cases, Particularly in Hospital Wards. By DAVID L. EDSALL, M.D., *American Journal of the Medical Sciences, April*, 1908.

This quite unusual (as coming from a physician), but very important contribution to the crying need for medical, as distinguished from surgical asepsis, *in hospitals*, with excellent illustrative cases, should be read by all public hygienists.

The epidemiologist who encounters secondary cases of infectious diseases *in duly warned private households* may be excused for being depressed. But the epidemiologist who encounters secondaries *in the very hospitals* to which the more seriously infective cases are removed for *the very purpose* of obviating infection from them, should be praised for the exasperation with which he too often learns later of spread of infection within the hospital itself, the one place above all others where it might be assumed that information, training and conscientious care of the latest and most approved kind would be concentrated against this very point. The negligence of physicians, nurses, superintendents of hospitals,—the very attitude of surprise that hospital people assume when asked about such precautions,—the light skepticism with which hospital attendants (because of the corresponding attitude "higher up") treat the hygienic requests of patients, the (occasional) directions of physicians, even the orders of public health departments, show that the basic essentials of medical asepsis are unknown or considered "faddy." We only regret that this scorching, but fully deserved indictment of hospital management in the hygiene of disease cannot be quoted here in full, and we heartily indorse the proposition that probationers should never be intrusted with the nursing of infectious diseases.

A mother who assumes risks in nursing her own infectious child is exercising her private right to risk her own safety, but a nurse, not fully trained, set to nurse infections without the necessary training or experience should have good grounds for suit at law if she contract the disease, *and so has any other inmate of the hospital, infected because of the employment of such a nurse, or because of other similar negligence.*

H. W. HILL.

Borderland Studies. Vol II. By GEORGE M. GOULD, M.D.
Published by P. Blakeston's Sons Co., Philadelphia.

This is a "miscellaneous collection of essays and addresses pertaining to medicine and the medical profession, and their relations to general science and thought." Printed in clear type on heavy paper, making a very attractive book of 311 pages.

The first chapter, The History of the House, is profusely illustrated.

While this book can never reach the circulation of the author's dictionaries, still it is one that can be read with interest both by physicians and laymen.

B. L. ARMS.

Methods and Devices for Bacterial Treatment of Sewage. By William Mayo Venable, M.S., M.I.S.C.E., etc. *First Edition, pp.* 231. *John Wiley & Sons, New York,* 1908.

Chap. I. Introduction.
Chap. II. Sources of Information About Sewage Apparatus.
Chap. III. Aërobic Treatment of Crude Sewage.
Chap. IV. Mechanical Removal of Sludge.
Chap. V. Anaërobic Treatment of Sewage.
Chap. VI. Intermittent Contact Systems.
Chap. VII. Automatic Discharging Devices.
Chap. VIII. Percolating Filters.
Chap. IX. Summary of Engineering Principles Regarding the Design of Sewage Purification Works.
Chap. X. Difficulties Experienced in Some Actual Installations.
Chap. XI. Suggested Designs to Meet Typical Conditions.

Chaps. III to VIII, inclusive, discuss sewage purification in its various aspects. The several methods of treatment considered in historical order are kept distinct in the presentation. Extensive use has been made of drawings of United States patents, both old and recent. The best feature of the book is the historical treatment of the various devices, especially patented ones, which have been used for sewage disposal. The descriptions of the various automatic discharging devices in Chap. VII is especially complete. In the chapter on Percolating Filters it does not seem as if enough attention has been given to the description of the various sprinkler nozzles in common use for distributing the sewage. Neither does the reviewer find any description of the aphidian distributor in common use in England. As has been stated above, the book contains very little about the chemistry and bacteriology of sewage, and of the biological processes which take place during the process of purification. In Chap. IX, however, are given several paragraphs which embody some of the conclusions of such studies by other workers. The writer gives the results of his experience in connection with the sewage disposal plants at Des Moines, Ia., and Fort Leavenworth, Kans., and in the last chapter of the book works out a design consisting of septic tank, deep filter bed and shallow contact bed for a typical case. The book is well illustrated, especially with cuts of siphons. It contains a reprint of an interesting plate by Leonard Metcalf, C.E., entitled the "Antecedents of the Septic Tank."

ROBERT SPURR WESTON.

BOOKS RECEIVED

Physician's Visiting List for 1909. *P. Blakeston's Son & Co., Philadelphia, Pa.* $1.00.

General Bacteriology. E. O. JORDAN. *W. B. Saunders & Company, Philadelphia, Pa.* $3.00. *

List of Publications of U. S. Public Health and Marine Hospital Service. October, 1908. *Government Printing Office.*

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* To be reviewed in February Journal.

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